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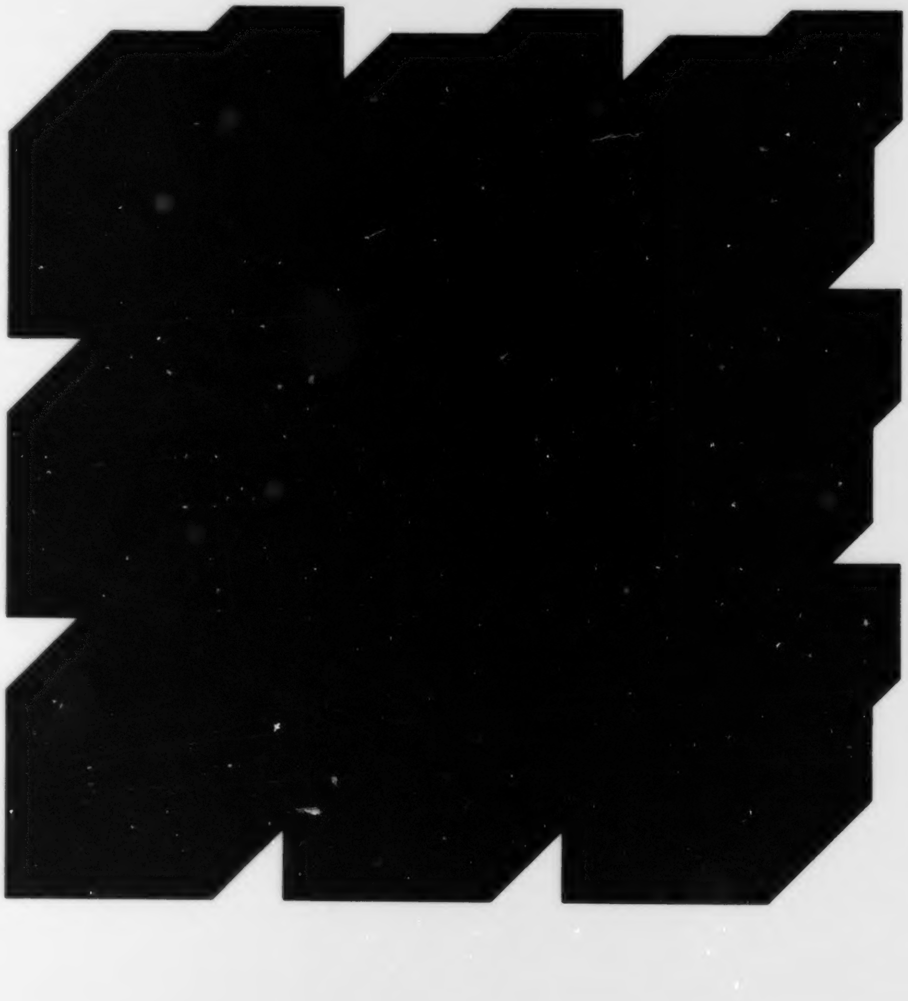

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## DISCUSSION PAPER NO. 296

# NEWFOUNDLAND REVISITED

By Lawrence Copithorne

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Lawrence Copithorne died on February 12th, 1986, prior to the completion of this manuscript. As a tribute to a respected economist, his colleagues at the Economic Council cooperated to ensure that this, his final endeavour, would be published as planned.

Patrick Robert
Director

## TABLE OF CONTENTS[*]

RÉSUMÉ i

PREFACE ix

1 SUMMARY 1-1

2 RESHAPING NEWFOUNDLAND: HIBERNIA AS CATALYST

The Current Status of Hibernia 2-1
Impact Areas 2-2
The Economic Council's Position 2-2
The Productivity Implications of Urban Structure 2-4
Demographic and Property Value Effects of Hibernia 2-10

3 DISPARITIES AND DEPENDENCE: AN UPDATE

Demography and Migration 3-1
Employment, Unemployment and Labour Force Participation 3-1
Income, Wage and Wealth Disparities 3-2
Survey of Consumer Finances Data 3-3
Social Statistics 3-5
The Role of Government 3-7
Provincial Revenues, Spending and Government Debt 3-8
The Promise of Hibernia 3-9

4 LABOUR MARKET PERFORMANCE

Labour Market Flows 4-2
Provincial Labour Markets: Empirical Evidence 4-4
An Analytical Framework 4-5
Migration 4-7
Out-migration 4-9
In-migration 4-9
Working Age Population 4-12
Participation Rates 4-13
Labour Supply 4-15
Labour Demand 4-17
Labour Market Efficiency: The People and Jobs Matching Mechanism 4-19
Wage Adjustment Mechanism 4-20
    1. The Direct Wage Parity Hypothesis 4-21
    2. Wage Parity Adjustment Hypothesis 4-22
    3. Crude Walrasian Adjustment 4-23
    4. Walrasian Adjustment with a Matching Mechanism 4-24
    5. The Price Expectations-Augmented Philips Curve 4-25
    6. Wage Parity, Price Expectations-Augmented Wage Adjustment 4-25
Conclusions 4-27

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[*] The Chapter numbers correspond with those in the original Economic Council study, *Newfoundland: From Dependency to Self-Reliance*. The limited resources of one part-time researcher did not permit a meaningful revisitation to productivity studies (Chapter 5), other natural resource industries (Chapter 7), or income maintenance studies (Chapter 9).

6 THE NEWFOUNDLAND FISHERY

Optimistic Signs 6-2
UPDATING HISTORY 6-3
Other Fishery Programs 6-9
The Offshore 6-10
Processing 6-10
Marketing 6-10
POLICY CHANGES 6-11
Enterprise Allocations 6-13
Gear and Boat Subsidies 6-17
Income Insurance 6-17
Foreign Fishing 6-18
HAS THE PROMISE OF EXTENDED FISHERIES JURISDICTION BEEN REALIZED? 6-19
Fitting a Fisheries Model 6-20
Quality Control 6-20
RESTRUCTURING THE NEWFOUNDLAND FISHERY 6-21
Overcoming Typical Expectations 6-27
Possible Results of Restructuring 6-28
THE AMERICAN CHALLENGE 6-29

8 HIBERNIA

Changes in the Official Perceptions of the Value of Hibernia 8-1
The Difficulty of Distinguishing Engineering and Geologic Fact from Political Reality 8-11
What One Cannot Safely Conclude 8-14
Positive Things That Could Be Done 8-16
Social Risk Analysis 8-17
The Impact of Government Policy on Means and Variances of Net Present Value Per Cubic Meter 8-19
The Flat Rate Gross Royalty 8-19
The Simple Cash Flow Tax 8-20

APPENDICES

A. LIST OF THE ECONOMIC COUNCIL'S RECOMMENDATIONS

B. NEWFOUNDLAND REFERENCE BACKGROUND STUDIES

C. NEWFOUNDLAND'S RESPONSE TO THE ECONOMIC COUNCIL STUDY

D. URBAN STRUCTURE:
MESSAGES FROM MOBIL'S ENVIRONMENTAL IMPACT STATEMENT

Hibernia's Possible Impact on Newfoundland's General Freight Traffic D-1
St. John's Airport D-2
The St. John's Impact Area D-2
The Come-By-Chance Impact Area D-3
The Argentia Impact Area D-6
Housing and Real Estate Values D-7
Impacts on Demography D-9
Housing D-11

E. CHARTS SHOWING LABOUR MARKET FLOWS, 1980-1984

F. A MODIFIED SCHAEFER MODEL FOR 2J3KL COD

G. DATA ON HIBERNIA RESERVES AND CASH FLOW SIMULATIONS

BIBLIOGRAPHY

# LIST OF FIGURES AND MAPS

EIS Figure 1.2-2 Hibernia: Fixed Production System Components 2-1a
EIS Figure 4.1-5 Hibernia: Conceptual View of Typical Topside Facilities on GBS Facility 2-1a
EIS Figure 2.8-1 Hibernia: Land Use in Eastern Newfoundland 2-2a
ECC Map 2-2 The Urban System of the Island of Newfoundland 2-3a
EIS Figure 2.6-1 Major Transportation Elements: Newfoundland 2-3b

Figure 4-1 Schematic Representation of the Labour Market 4-5a
Figure 4-2 Labour Market Mechanisms 4-5b

Map 6-1 The Atlantic Fishery 6-1a
Figure 6-1 Inshore-Offshore Fishing Tradeoff 6-1b
Figure 6-2 Optimal and Suboptimal Fishing Effort 6-1b
Figure 6-3 Relative Abundance of Principal Groundfish and Flounders 6-12a
Figure 6-3A Recovery of Canadian Fish Stocks After Extended Fisheries Jurisdiction in 1977 6-12b
Figure 6-4 Abundance of Atlantic Cod Relative to 2J3KL Cod 6-12c
DFO Figure 10 Indices of Abundance For Groundfish Stocks Within, Overlapping, and Outside Canadian 200 Mile Zone 6-18a
Figure 6-5 Optimal Economic Yield for 2J3KL Cod 6-20a

EIS Figure 1.1-1 Location of the Hibernia Field 8-1a
Figure 8-1 Economic and Uneconomic Oil Reserves 8-12
Figure 8-2 Levelized Cost as a Random Variable 8-17a
Figure 8-3 Price, Levelized Cost and Net Present Values as Random Variables 8-17b

DFO Figure 1 Catch per Day Fished by Large Canadian Otter Trawlers F-1c

# LIST OF CHARTS

ECC Chart 3-1 Quarterly Migration, 1961.1 - 1984.1 3-1a
ECC Chart 3-2 Employment Growth by Selected Regions 3-1c
ECC Chart 3-3A Labour Force Participation Rates 3-1d
ECC Chart 3-3B Labour Force Participation Rates 3-1d

New Chart 3-1 Unemployment Rates 3-1e
New Chart 3-2A Average Weekly Earnings 3-2a
New Chart 3-2B Average Hourly Earnings in Manufacturing 3-2a

Chart 4-1 Proportion of Employed Persons Leaving the Labour Force by Month, 1983 4-1a
Chart 4-2 Proportion of Persons Not in Labour Force Moving into Jobs, by Month, 1983 4-1b
Chart 4-3 Proportion of Unemployed Workers Finding a Job That Month, 1983 4-1c
Chart 4-4 Proportion of Employed Workers Who Keep Their Jobs From Month to Month 4-1d

Chart 8-1 Evolution of Expected Production Profile: Hibernia 8-2a

Chart E-1 Proportion of Employed Persons Leaving the Labour Force by Month, January 1980 Through September 1984 E-1
Chart E-2 Proportion of Persons Not in Labour Force Moving into Jobs, by Month, January 1980 Through September 1984 E-2.
Chart E-3 Proportion of Unemployed Workers Finding a Job Each Month, Canada and Newfoundland, January 1980 To September 1984 E-3
Chart E-4 Proportion of Employed Workers Who Keep Their Jobs From Month to Month E-4
Chart E-5 Proportion of Unemployed Persons Who Remain Unemployed E-5
Chart E-6 Proportion of Persons Outside the Labour Force Who Remain Outside From Month to Month E-6
Chart E-7 Proportion of Employed Persons Who Move Into Unemployment By Month E-7
Chart E-8 Proportion of Persons Not in the Labour Force Who Begin Looking for Work, by Month E-8
Chart E-9 Proportion of Unemployed Persons Who Give Up and Stop Looking for Work, by Month E-9

Chart F-1 Scatter Diagram: Growth of Fish as a Function of Biomass F-1a
Chart F-2 Otter Trawler Catch per Day Fished F-1b
Chart F-3 Catch per Unit Effort, 2J3KL Cos 1962-1984 F-1d
Chart F-4 Modified Schaefer Model for 2J3KL Cod: Estimated for 1962-84 Data F-2a

# LIST OF TABLES

## Chapter 2

ECC Table 2-1 Populations Accessible to Certain Service Centres or 'Impact Areas' 2-3
ECC Table 2-2 Transportation Subsidies on Newfoundland Traffic 1977-85 2-6
New Table 2-1 Equivalent Manpower Count for Terra Transport 2-6
ECC Table 2-3 General Freight Traffic to Newfoundland, Selected Years, 1968-85 2-7

## Chapter 3

ECC Table 3-1 Demographic Characteristics by Province, 1966 to 1984 3-1b
ECC Table 3-2 Income Per Capita 3-2
New Table 3-1 Weighted Averages of Individual Income Disparities: Consumer Survey Information, 1981 3-4
ECC Table 3-4 Social Measures 3-5
New Table 3-2 Composition of Aggregate Demand 3-8
ECC Table 3-5 Distribution of Provincial Gross General Revenue 3-8a
ECC Table 3-6 Federal Transfer Payments to Persons 3-8b
ECC Table 3-12 Provincial Direct and Indirect Liabilities 3-8c
ECC Table 3-13 Gross Provincial Debt Charges 3-8d
ECC Table 3-14 Distribution of Bond Issues 3-3e
ECC Table 3-15 Major Components of Provincial Loans 3-9a

## Chapter 4

Table 4-1 Peak Labour Market Flows From August 1984 to September 1984 4-3
Table 4-2 Average Quarterly Out-, In- and Net-Migration 4-8
Table 4-3 Out-migration 1966.1-1984.4 Best Explanatory Regressions 4-10
Table 4-4 In-migration 1966.1-1984.4 Best Explanatory Regressions 4-11
Table 4-5 The Influence of Migration and Births On Working Age Population 4-12
Table 4-6 Participation Rates 4-14
Table 4-7 Labour Supply 4-16
Table 4-8 Provincial Labour Demand Elasticities 4-18
Table 4-9 Estimating the Unemplyment-Vacancy Locus by Province 4-20
Table 4-10 Direct Wage Rate Emulation, 1966.2-1984.4 4-21
Table 4-11 Wage Change Emulation, 1962.2-1984.4 4-22
Table 4-12 Relationships Between Alberta Wage Changes and its Unemployment Rate 4-23
Table 4-13 Wage Parity-, Price Expectations-Augmented Phillips Curve Wage Adjustment 4-26

## Chapter 6

ECC Table 6-2 Selected Fishery Statistics, Newfoundland 1972-84 6-4
New Table 6-1 Numbers of Full-Time and Part-Time Fishermen, Their Incomes and Weeks Worked, 1981 6-7
New Table 6-2 Summary of Average Incomes and Weeks Worked by Region for Full-Time and Part-Time Fishermen Combined, 1984 6-8
ECC Table 6-2 Continued: Selected Fishery Statistics, Newfoundland 1972-84 6-9
New Table 6-3 Allocations of Total Allowable Catch Versus the Actual Catch 6-19
New Table 6-4 History of Canadian and Foreign Allocation of Total Allowable Catch of Fish of All Species, Atlantic Coast of Canada 6-20
New Table 6-5 Fishery Products International Refinancing 6-24

## Chapter 8

Table 8-1 Hibernia's Economic Parameters: Changes in Official Perceptions 8-3
Table 8-2 Uncertainty About Hibernia and Avalone Oil Reserves: An Illustrative Example Based on Realistic Assumptions 8-13
Table 8-3 Impact of thel Cash Flow Tax on Private Investment Incentives 8-21
Table 8-4 Illustrating the Economic Resilience of the Royalty and Cash Flow Tax 8-23

## Appendix D

EIS Table 2.2-4 Total Offshore Expenditures by Supply Company D-3
EIS Table 2.5-4 Multiple Listing Service Real Estate Activity, St. John's CMA, Single-Detached Units: 1975 to 1984 D-7
New Table D-1 Historic Real Estate Values for a Two-Storey Detached House, St. John's, Ottawa, Calgary and Edmonton D-8

## Appendix F

Table F-1 Sensitivity Analysis of Economic Rents in 2J3KL Cod F-3
Table F-2 Simulation Data for Schaefer Model F-3a

Table G-1 Potential Oil, Natural Gas Liquids and Marketable Gas Reserves of the Hibernia Field G-1
Table G-2 The Evolution of Expected Hibernia Production Profiles G-2

# RÉSUMÉ

Cette mise à jour partielle de l'étude intitulée Au-delà de la dépendance - Pour une productivité accrue à Terre-Neuve, publiée en 1980 par le Conseil économique, a été effectuée à la demande de l'ancien président du Conseil économique pour répondre à des suggestions de personnes qui se préoccupent de l'économie terre-neuvienne et pour préparer aussi certains documents que le président a présentés, en octobre 1985, à la Commission royale d'enquête sur l'emploi et le chômage, créée par le gouvernement de Terre-Neuve.

Le titre de l'étude évoquait - et continue toujours d'évoquer - un espoir à long terme, non une éventualité susceptible de se réaliser à court terme. Le Conseil a correctement prévu qu'il se produirait certains changements démographiques qui influeraient sur les taux de natalité et les taux de dépendance à Terre-Neuve, et qui ont contribué à réduire quelque peu les disparités de revenu par habitant. On constate que l'évolution s'est déjà infléchie dans le sens recommandé par le Conseil économique. Toutefois, au cours des cinq années écoulées depuis la publication de l'étude du Conseil, le monde occidental a connu une grave récession qui, au Canada, a été la pire depuis la Crise des années 30. Le taux de chômage a atteint 26,2 % à Terre-Neuve en janvier 1985, soit le niveau le plus élevé observé depuis que la province s'est jointe à la Confédération en 1949. La balance des paiements avec le reste du Canada accuse un déficit équivalant à un tiers du produit intérieur brut de la province, dont une bonne partie est compensée par des paiements de transfert du gouvernement fédéral aux particuliers et au gouvernement terre-neuvien. Cependant, comme le Conseil économique le soulignait en 1980, des transferts de revenu considérables s'effectuent aussi de Terre-Neuve vers le reste du Canada, le plus important étant le versement annuel à l'Hydro-Québec d'une rente économique de plusieurs centaines de millions de dollars provenant du projet hydro-électrique de Churchill Falls, au Labrador, en vertu d'un contrat d'une durée de 65 ans. Or, Terre-Neuve touche toujours moins de 3 mills le kWh pour environ 34,5 milliards de kWh d'électricité produits chaque année. Les recettes moyennes perçues par la compagnie d'électricité qui utilise cette capacité sont plus de onze fois supérieures.

En rétrospective, on constate que l'analyse économique présentée dans Au-delà de la dépendance - Pour une productivité accrue à Terre-Neuve était généralement juste et que la majorité des recommandations découlent encore logiquement de cette analyse. La plupart de ces recommandations n'ont toutefois pas encore été mises en oeuvre.

## GÉOGRAPHIE

On note une très lente amélioration sur le plan des désavantages économiques liés au cadre géographique de l'activité économique et au réseau de transport. Conformément aux recommandations du Conseil, il existe maintenant à St-John's un modeste service de transbordement des cargaisons à manutentation horizontale, mais le réseau de transport a encore besoin d'amélioration, comme le souligne un document préparé par Mobil Oil (Hibernia Environmental Impact Statement ). L'activité économique continue de se concentrer graduellement dans les villes, les travailleurs se déplaçant entre les petits ports de pêche de la côte et St-John's ou d'autres centres urbains. Toutefois, la plupart des obstacles créés par les politiques, qui empêchent de viabiliser davantage la structure géographique de l'activité économique, existent toujours. La subvention au service de traversier du Golfe et la perte annuelle subie par le chemin de fer à voie étroite atteignent toujours des sommes considérables ( au delà de 100 millions de dollars par année en transferts fédéraux qui sont versés en vertu de l'entente régissant l'adhésion à la Confédération ), ce qui renforce des tendances économiques coûteuses et contraires à la viabilité de l'économie provinciale. Les subventions versées à différents modes de tranport qui offrent des services à destination de Terre-Neuve et à l'intérieur de la province continuent d'alimenter les controverses, de donner lieu à des confrontations et de susciter des interventions ministérielles. L'espoir le plus prometteur réside dans la mise en valeur du champ pétrolifère Hibernia, dans la mesure où celle-ci permettra d'améliorer l'infrastructure des transports ainsi que la structure urbaine dans l'est de Terre-Neuve, ce qui pourrait entraîner une réduction des coûts et un accroissement de la productivité.

## LE MARCHÉ DU TRAVAIL

La croissance de l'emploi a été très lente à Terre-Neuve de 1979 à 1984, beaucoup plus que dans d'autres régions du Canada ( tableau 3-2 du CEC ). Le taux d'activité se situe à environ 10 points de pourcentage sous la moyenne nationale. Le très fort caractère saisonnier des mouvements de travailleurs, à Terre-Neuve, est clairement démontré par de nouvelles données ( annexe E ). Beaucoup quittent ( ou perdent ) leur emploi au cours de l'été, particulièrement entre les mois d'août et septembre, à la fin de la période d'abondance de la morue. De plus, une autre vague de départs se produit entre octobre et novembre, alors que des travailleurs quittent leur emploi, au moment où commence le versement des prestations d'assurance-chômage aux pêcheurs. Beaucoup de ces travailleurs quittent alors la population active et y reviennent, semble-t-il, en acceptant un nouvel emploi durant la période de mai à la fin de juillet de l'année suivante, sans passer par un état de chômage ( défini comme étant la recherche active d'un emploi ). Par conséquent, une bonne partie du chômage à Terre-Neuve n'est pas pris en compte dans le calcul des taux de chômage, aussi choquant que cela puisse paraître.

Dans les trois provinces étudiées, une augmentation de l'emploi de 1 % entraîne un fort accroissement de la taille de la population active, soit environ 0,7 % à Terre-Neuve et des pourcentages légèrement moindres en Ontario et en Alberta. L'effet est tellement considérable à Terre-Neuve ( où la population active dépasse d'environ 30 % le nombre de personnes employées, que la création d'emplois n'aura presque aucun effet sur le niveau de chômage observé dans la province. À titre de comparaison, il faut créer deux emplois en Ontario pour y réduire le chômage d'une personne. Il s'agit toutefois là d'une réduction encore dix fois plus forte du chômage observé que ce que la même politique pourrait permettre de réaliser à Terre-Neuve.

Terre-Neuve est apparemment un réservoir tampon pour le chômage au Canada. En période de prospértité économique, les travailleurs quittent la province pour aller en Ontario, en Alberta et ailleurs; lorsque les choses vont mal, cette émigration cesse et certains Terre-Neuviens reviennent dans leur province. Par conséquent, on peut dire que les chômeurs restent "coincés" à Terre-Neuve durant les périodes de récession. Une hausse de 1 % de l'emploi en Ontario augmentera apparemment le taux d'émigration des Terre-Neuviens d'environ 3,5 % et réduira l'immigration vers cette province d'environ 1 %. D'autre part, un accroissement de 1 % du taux de chômage en Ontario comprimera apparemment l'émigration de Terre-Neuve d'environ 0,6 % et pourra encourager quelque peu les retours vers cette province ( chapitre 4 ).

Il semble que le retour des émigrés soit un phénomène important et qu'il a lieu en grande partie durant le même trimestre que la migration initiale. Les données indiquent que parmi les immigrants qui se rendent à Terre-Neuve, environ 18 % seulement émigreront de nouveau au cours du même trimestre. Par contre, jusqu'à 70 % des gens qui vont vivre en Ontario ou en Alberta peuvent quittrer ces provinces dans les trois mois qui suivent. Il semble possible que les gens qui se rendent à Terre-Neuve soient en grande partie des Terre-Neuviens qui reviennent pour rester, tandis que beaucoup de personnes qui choisissent l'Ontario ou l'Alberta sont des gens qui vont y "tenter fortune",mais qui n'y restent pas longtemps.

D'après les données, il semble aussi que les émigrants de Terre-Neuve sont surtout des gens en âge de travailler - pour la plupart des jeunes qui se joignent à la population active - tandis que la majorité des immigrants ne le sont pas. D'autre part, les trois quarts des gens qui choisissent de s'installer en Alberta et les neuf dixièmes des émigrants de cette province, sont des personnes d'âge actif, dont le comportement économique est fortement influencé par les occasions qui s'offrent sur ce même plan économique. En Ontario, les immigrants sont en général d'âge actif, tandis que la plupart des émigrants ne le sont pas. C'est donc dire que ce sont de jeunes travailleurs qui quittent Terre-Neuve, pour revenir parfois plus tard avec leurs familles. Les personnes qui déménagent en Alberta n'ont en général pas d'enfants, et celles qui en ont ultérieurement sont un peu moins portées à quitter la province que ne le sont les travailleurs sans enfant.

Les personnes qui émigrent en Ontario sont peut-être en général de jeunes travailleurs avec peu de personnes à charge, alors que ceux qui quittent l'Ontario peuvent être, par exemple, des gestionnaires de niveau intermédiaire qui vont, avec leur famille, à la recherche de bons emplois dans les régions périphériques.

Comme on pourrait s'y attendre par suite des migrations, l'offre de travail s'accroît à Terre-Neuve lorsque le chômage s'élève en Ontario, que le nombre d'emplois augmente à Terre-Neuve et que les taux de salaire locaux s'élèvent dans cette province. L'économie de l'Alberta et, dans une moindre mesure, celle de Terre-Neuve sont plus axées sur l'exportation que l'Ontario ne l'est. La demande de travail semble être très inélastique dans les trois provinces étudiées; une hausse de 1 % du taux de salaire local peut entraîner une baisse de l'emploi de 0,2 % seulement. Par conséquent, il est logique que le mouvement syndical fasse des pressions pour obtenir des hausses de salaires; même si certains travailleurs perdent leur emploi lorsque les salaires augmentent, la masse salariale, semble-t-il, s'accroîtra.

La parité des salaires avec l'Ontario semble être le principal facteur déterminant du niveau des salaires en Alberta et à Terre-Neuve ( tableaux 4-10, 4-11, et 4-13 ). Toutes choses étant égales, il semble qu'une augmentation de 1 % du salaire hebdomadaire moyen en Ontario se traduise par une hausse d'au moins 0,5 % de la rémunération hebdomadaire moyenne à Terre-Neuve et en Alberta.

Le deuxième facteur déterminant du niveau des salaires est le taux d'augmentation des prix à la consommation. Si les répercussions des modifications salariales semblent se manifester de façon très rapide ( moins de trois mois ), l'incidence d'une augmentation du niveau général des prix prend environ trois mois pour se faire sentir en Alberta , mais environ six mois ou plus à Terre-Neuve. Une hausse de 1 % du niveau des prix à la consommation semble entraîner, six mois plus tard, une augmentation d'au moins 0,3 % de la rémunération horaire moyenne dans la province.

L'incidence exercée conjointement par les augmentations de salaires en Ontario et par le rattrapage attribuable à l'inflation joue un rôle tellement important qu'elle explique la majeure partie de la variation de la rémunération hebdomadaire moyenne tant à Terre-Neuve qu'en Alberta. Le rôle prépondérant joué par ces deux facteurs laisse peu de place à l'incidence des taux de chômage et des postes vacants sur le marché local pour expliquer les variations de salaires. Néanmoins, il appert que les variations salariales en Alberta sont sensibles à l'état relatif de l'offre et de la demande du marché du travail.

Nous n'avons pas encore réussi à prouver à l'aide de statistiques officielles que les salaires à Terre-Neuve sont flexibles à la baisse. Les données indiquent plutôt qu'en dépit d'un chômage massif, la rémunération horaire moyenne dans l'industrie manufacturière a augmenté dans cette province pour dépasser la moyenne nationale pendant un court moment en 1984, du moins dans les établissements où Statistique Canada a recueilli des données. D'après l'enquête du Conseil économique sur les attitudes de la population face au travail, peu importe les autres variables utilisées, les Terre-Neuviens sont restés statistiquement beaucoup moins disposés à accepter des réductions de salaire, pour obtenir un emploi, que ne l'était un échantillon aléatoire de travailleurs ontariens.

Notre insistence sur les salaires à Terre-Neuve ne vient pas tellement de notre souci d'équité ou de répartition des revenus, que de notre préoccupation, sur le plan macroéconomique, de l'existence à long terme d'emplois dans l'ensemble de l'économie terre-neuvienne. Une région qui affiche simultanément un chômage massif et un déficit très considérable de sa balance des paiements ( comme c'est le cas de Terre-Neuve ) présente les symptômes d'une économie dont le taux de change est fondamentalement surévalué. Sur le plan international, de telles régions affichent habituellement, par rapport à leurs partenaires commerciaux, une productivité plus faible, des prix plus élevés des facteurs de production et des désavantages en matière de coûts de transport; ces facteurs négatifs peuvent toutefois être compensés par une dépréciation de la monnaie de la région. Ainsi, des désavantages de cette nature ont eu pour effet de ramener la valeur du dollar canadien à environ 70 % de celle du dollar américain sur les marchés internationaux. Par suite de cette dépréciation de notre monnaie, la compétitivité du Canada sur les marchés mondiaux et les niveaux d'emploi au Canada ont été maintenus.

La province de Terre-Neuve est dans la même situation, par rapport au reste du pays, que l'est le Canada relativement aux États-Unis. Il lui faudrait dévaluer sa monnaie par rapport au reste du pays pour compenser sa productivité plus faible et les désavantages de son économie sur le plan des coûts de transport. Comme son taux de change est au pair avec la devise canadienne, Terre-Neuve ne peut dévaluer sa monnaie pour rendre ses coûts concurrentiels avec ceux de l'ensemble du pays ou pour préserver son niveau d'emploi. Puisqu'il est impossible de modifier le taux de change, il lui faut alors trouver d'autres moyens d'abaisser ses coûts, soit par l'entremise d'un accroissement de la productivité ou d'une réduction des prix de facteurs de production, ou des deux. Pour beaucoup de gens, les récentes augmentations de salaires consenties à Terre-Neuve seront considérées comme une bonne chose; ils estiment que le travailleurs terre-neuviens reçoivent maintenant un traitement équitable sur le marché du travail, comme en témoigne une certaine parité salariale avec les travailleurs ontariens. Mais ces augmentations de salaires sans accroissement compensatoire de la productivité affaibliront davantage la viabilité à long terme de l'emploi à Terre-Neuve. Pouvoir revendiquer la parité salariale pour un emploi qui n'existe pas n'a rien de consolant.

Le seul facteur modérateur important des salaires à Terre-Neuve - du moins à la connaissance de l'auteur - est le contrat de travail récemment conclu entre la firme Fishery Products International et le syndicat des pêcheurs - Fishermen's Union - ( chapitre 6 ). L'incidence de cette entente salariale ne s'est pas encore reflétée dans les statistiques officielles. Cet accord d'une durée de quatre ans comporte des hausses de salaires qui sont inférieures au taux d'inflation et fait suite à une période de deux ans au cours de laquelle aucune augmentation salariale n'a été consentie. L'accord s'inscrit dans le contexte de la faillite de presque toute l'industrie terre-neuvienne du conditionnement du poisson, la seule industrie manufacturière importante qui subsiste et qui pourrait vraisemblablement quitter la province si l'évolution des taux de salaire en venait à s'écarter considérablement de celle de la productivité. Bien qu'il soit trop tôt pour l'affirmer, il semble - du moins selon certaines sources dans l'industrie - que cette nouvelle entente et qu'une part des pénibles efforts de restructuration qu'elle a nécessités aient été possibles grâce à un changement fondamental des attitudes et des perceptions des travailleurs et des dirigeants de l'industrie. L'intervention politique n'y a joué aucun rôle.

Des analyses empiriques indiquent que le marché du travail, tant en Ontario qu'en Alberta, assure une meilleure concordance des personnes et des emplois que n'arrive à le faire le Canada dans son ensemble ( tableau 4-9 ). Il n'est pas étonnant que le marché du travail de Terre-Neuve éprouve des difficultés à assortir des travailleurs dispersés sur environ 6 000 milles de côte avec le petit nombre d'emplois qui peuvent être créés dans les divers centres. En fait, les régressions statistiques n'arrivent même pas à mettre en évidence l'existence d'un "mécanisme de rapprochement entre chômeurs et emplois" dans le cas de Terre-Neuve ( tableau 4-9 ). Les forces politiques, qui s'opposent fermement aux tendances économiques vers l'urbanisation susceptibles d'unifier le marché du travail à Terre-Neuve, ne sont peut-être pas très constructives non plus pour l'économie de la province ou du pays.

Le phénomène des "travailleurs découragés" semble être très répandu à Terre-Neuve, ce qui explique probablement le rôle mineur que le taux de chômage y joue dans presque toutes les régressions statistiques. D'après la définition que Statistique Canada donne du taux de chômage, celui de Terre-Neuve n'est probablement pas une mesure très exacte de la véritable ampleur du problème. La difficulté vient du fait que, pour être considérée en chômage, une personne doit rechercher activement un emploi; or, dans certaines régions rurales de Terre-Neuve, comme on le sait, les personnes qui ne peuvent risquer d'émigrer ( parce qu'elles seraient ainsi susceptibles de perdre notamment leur admisssibilité aux prestations régionalisées d'assurance-chômage ou aux prestations versées aux pêcheurs ), n'ont pas d'incitation à se chercher activement du travail durant certaines saisons.

Il faut donc se préoccuper des effets néfastes sur la mobilité des travailleurs que comporte la politique de soutien du revenu. Dans chaque province étudiée, l'offre de travail est nettement liée à l'ampleur du chômage dans les autres provinces où ses travailleurs peuvent émigrer, ou d'où peuvent revenir des gens déjà émigrés. Les migrations jouent un rôle important. Elles sont sensibles aux variables économiques. À cet égard, la suggestion du Conseil économique reste toujours pertinente, à savoir que "l'on étudie de plus près les effets des prestations régionalisées d'assurance-chômage et des conditions spéciales d'admissibilité à ces prestations, en vue d'en supprimer les éléments propres à stimuler ou à entraver les flux migratoires, soit à l'intérieur même des provinces, soit d'une province à l'autre" ( recommandation nº 5 ).

## LA PÊCHE

Cette industrie compte encore trop de pêcheurs pour la quantité de poisson existante. La productivité marginale du travail y est négative. Après une injection de 250 millions de dollars au titre de la "restructuration", qui a sauvé de la faillite les entreprises de conditionnement du poisson, la pêche est peut-être sur le point de devenir un succès, mais seulement si les gouvernements interviennent pour soulager l'industrie de son problème de maintien du revenu de milliers de pêcheurs et de travailleurs des usines de conditionnement du poisson qui sont sous-employés. C'est ce problème même qui est à l'origine de la présence dans l'industrie d'un fort excédent de pêcheurs. Or, les nouvelles données sur le revenu confirment les craintes du Conseil, et pire encore : le long du littoral nord-est de Terre-Neuve et du Labrador, les subventions d'appoint au revenu, sous forme de prestations d'assurance-chômage, ont pris en moyenne plus d'importance que la pêche comme source de revenu ( nouveau tableau 6-2 ).

Toutefois, les données présentées au chapitre 6 nous permettent d'être optimistes. Conformément aux recommandations du Conseil économique, le nouveau système de répartition des prises entre les entreprises semble être un moyen très approprié de mettre en place un système de droits de propriété dans le secteur de la pêche hauturière. Les stocks de poisson, qui sont passés sous contrôle canadien à cause de l'extension par le Canada de sa zone économique exclusive, se reconstituent plus lentement que prévu, mais beaucoup mieux que ce n'est le cas dans les eaux américaines ou internationales voisines. À cause de ces changements, la productivité de la flotte canadienne de chalutiers s'est accrue considérablement. Il semble exister un nouveau respect mutuel et de meilleures communications entre la direction de la nouvelle société gouvernementale ( Fishery Products International ) et le syndicat des travailleurs ( Fishermen's Union ). La société désire se défaire de 15 de ses usines de conditionnement plus petites et plus saisonnières, afin d'en arriver à poursuivre les opérations de pêche sur une base annuelle et d'établir ainsi une industrie de conditionnement du poisson très productive, de haute qualité et pouvant assurer de bons salaires. Le syndicat a collaboré à la restructuration de l'industrie et, comme on l'a déjà dit, a accepté un contrat sans précédent de quatre ans, qui prévoit une baisse des salaires réels pendant que l'industrie se remet sur pied.

Quant à savoir si Fishery Products International peut réussir à se défaire des 15 usines de conditionnement qui ne sont pas rentables, cela dépend vraiment de l'attitude des gouvernements, à savoir s'ils consentiront à soutenir financièrement les personnes et les collectivités qui perdront leurs sources de revenu, ainsi que l'accès à l'assurance-chômage, si des acheteurs privés ne trouvent pas une façon de rentabiliser ces usines. Les statistiques indiquent que beaucoup de travailleurs des usines de conditionnement du poisson et de pêcheurs qui les approvisionnent ne travaillent guère plus de dix semaines par année, et une bonne partie de leur revenu leur vient de l'assurance-chômage. Si les gouvernements ne font rien pour s'occuper d'eux directement, ils pourraient encore forcer l'industrie à perdre pied une seconde fois.

D'autre part, le Département du Commerce des États-Unis a décidé d'imposer des droits de douane supplémentaires de 6,85 % sur les importations de certaines espèces de poissons de fond du Canada, pour compenser la longue liste de "subventions", y compris le capital-actions investi dans la société Fishery Products International et les prestations d'assurance-chômage versées aux pêcheurs canadiens et aux travailleurs des usines de conditionnement du poisson. La politique implicite actuelle consistant à utiliser l'industrie canadienne de la pêche comme "employeur de dernier ressort" pour masquer le chômage, et comme moyen de distribuer des revenus aux gens dans le besoin, diminue l'accès de l'industrie au marché international.

## HIBERNIA

La perspective de la mise en valeur du champ pétrolifère Hibernia a été, depuis 1979, et demeure le meilleur espoir d'accroître les revenus, l'emploi et la productivité à Terre-Neuve, et de réduire aussi l'importance relative des paiements de transfert comme source de revenu pour le gouvernement provincial et les citoyens. La signature de l'Accord de l'Atlantique, le 11 février, a accordé au gouvernement de Terre-Neuve presque tout ce qu'il demandait, soit le droit de percevoir des recettes sur les ressources énergétiques provenant du gisement Hibernia, comme s'il s'agissait de ressources extraites de terres provinciales, en dépit du fait que les tribunaux ont établi que le pétrole sous-marin était de juridiction fédérale.

Toutefois, à l'heure actuelle, la rentabilité économique du gisement Hibernia est toujours très incertaine. L'importance des réserves, les coûts de production ainsi que les prix futurs du pétrole figurent parmi ces éléments d'incertitude. Sur papier, un gisement qui promettait à l'origine - du moins le croyait-on - de produire une rente économique de 8 milliards de dollars ne peut maintenant pas être mis en expoitation sans entraîner une perte considérable - en supposant que le prix mondial du pétrole aurait pu être maintenu à 35 dollars canadiens le baril ( comme c'était le cas avant sa chute spectaculaire de janvier 1986 ). Dans les négociations actuelles, le gouvernement fédéral est invité à faire le plus de concessions possible, y compris des réductions de droits de douane et de taxes d'accise qui pourraient normalement être prélevées sur les matériaux et l'équipement requis pour le projet. Or comme le gouvernement fédéral a vraisemblablement cessé de percevoir des rentes économiques provenant du pétrole et du gaz, lorsqu'il a signé l'Accord de l'Ouest, le 11 mars, et comme il n'a présenté aucune nouvelle taxe liée aux profits dans son budget du 23 mai, les négociateurs fédéraux disposent de peu de moyens d'aider le projet. Les concessions fiscales qu'ils accorderaient pourraient provenir en partie de la réduction de l'impôt sur le revenu, payable en Alberta, par les sociétés qui participent à la mise en valeur du gisement Hibernia.

Étant donné la baisse du prix mondial du pétrole et la hausse des salaires à Terre-Neuve, il devient impérieux de disposer d'un régime fiscal qui innove et qui puisse très bien réagir aux fluctuations économiques, c'est-à-dire qui n'exigera pas le paiement de rentes économiques qui n'existent pas et qui, pourtant, pourra en prélever certaines à l'avenir si le prix mondial du pétrole se met à monter ou si les réserves de pétrole sous-marin et leur production devaient s'avérer plus importantes que ce que l'entreprise exploitant Hibernia prévoit elle-même. La taxe sur les flux financiers, analysée au chapitre 8, fournit un excellent point de référence pour mesurer la performance du régime fiscal qui est négocié. Même appliquée à des taux atteignant 100 %, cette taxe ne peut jamais faire baisser la valeur attendue d'un gisement de pétrole au point qu'elle devienne négative. De plus, à mesure qu'elle s'accroît à partir de zéro, le risque, pour les investisseurs, baisse de façon exponentielle. Cette taxe offre aux gouvernements un moyen d'aider légitimement une société pétrolière aux premières étapes de la mise en valeur d'un gisement, sans pour autant renoncer à la possibilité de toucher une part substantielle de la rente économique à long terme, s'il y en a une. La taxe réagit automatiquement aux fluctuations imprévues des coûts d'un projet ou au prix du pétrole, en répartissant le fardeau financier et en recueillant les retombées selon les proportions déterminées par le taux de la taxe.

Sachant que l'exploitation plus poussée des ressources naturelles de Terre-Neuve est susceptible d'augmenter la dépendance de la population active à l'égard des paiements de transfert, comme cela s'est manifestement produit dans le cas de l'industrie de la pêche, il faut bien se garder de laisser entendre que le projet Hibernia réduira l'état de dépendance de la province. Étant donné l'état actuel des flux financiers du projet et le caractère cyclique des emplois dans le secteur de la construction ( entraînant le versement de prestations d'assurance-chômage lorsque l'activité de cette industrie ralentit ), il n'est pas impossible que l'exploitation du gisement Hibernia finisse par représenter un fardeau pour l'économie canadienne. Le projet aurait peut-être de meilleures chances de réussir si les gouvernements, les travailleurs et les compagnies concernées y mettaient le moins de contraintes possible et établissaient des méthodes de détermination des prix de la ressource naturelle et du travail de la façon la plus "élastique" possible. Une taxe sur les flux financiers est sûrement une méthode souple d'établir un prix pour la ressource. Devant des taux de chômage dépassant de loin 25 %, on ne peut s'empêcher de se demander s'il n'y aurait pas lieu de permettre aux travailleurs de Terre-Neuve de se trouver des emplois dans le cadre du projet Hibernia, même si les perspectives économiques actuelles sont médiocres. Si les travailleurs étaient disposés à accepter, pour un salaire modéré, certains emplois désignés du projet Hibernia, plus une part des rentes économiques futures ( s'il y en a ), il serait possible de maintenir à un bas niveau les coûts de construction, tout en espérant que les travailleurs puissent éventuellement toucher des salaires équivalents à ceux payés partout dans le monde dans cette industrie. Mais les mouvements passés en faveur des augmentations de salaires à Terre-Neuve, ainsi que les réponses à la quetion salariale dans l'enquête du Conseil économique sur les attitudes de la population face au travail, indiquent qu'une telle formule serait vraisemblablement rejetée par les Terre-Neuviens.

## PREFACE

On March 6th, 1978 the Prime Minister of Canada, in response to an initiative of the Government of Newfoundland and Labrador, asked the Chairman of the Economic Council of Canada to carry out a special study of economic development problems and opportunities in Newfoundland. The final report entitled *Newfoundland: From Dependency to Self Reliance*, was released in Newfoundland on 19th of November 1980.

On June 28th, 1985, the Chairman of the Economic Council of Canada asked the author (who had directed the project group for the original "Newfoundland Reference") to prepare a brief follow-up report for Council use[1] and for subsequent publication as a discussion paper. This work was to consist of a review of the main analytical findings on which policy recommendations had been based, in order to assess if they are still applicable. (Appendix A contains a list of the Council's recommendations.) The review was to take the form of an update of some of the analysis presented in the Newfoundland report subject to the availability of data. Priority was to be given to material that would have direct relevance to the terms of reference of the Newfoundland Royal Commission on Employment and Unemployment. This Provincial Royal Commission, Chaired by Dr. Douglas House, was established on January 23rd, 1985 and asked to report in 1986.

The Royal Commission is especially concerned with prospects for employment and income growth as a result of oil and gas development, the distribution of these benefits throughout the Province, and the problem of unemployment which has grown in recent months. The Commission is to pay special attention to the unemployment of young people, long term unemployment, and to regional and demographic aspects. The Commission is to study contributing factors to unemployment, including economic and industrial adjustments, seasonal and cyclical causes, industrial structure, educational levels and skills, the matching of training and employment opportunities, labour mobility and migration, specific regional problems, wage levels, productivity, automation and technical changes, trends in economic and population growth, Federal and Provincial job creation programs and the Community Development Program of the Department of Social Services. Finally the Commission is to investigate the adequacy of the income support system in mitigating the adverse social and economic effects of unemployment.

Many of these issues were touched by the Economics Council's 1980 Newfoundland Report, and in its background studies (Appendix B). But the state of unemployment in Newfoundland has worsened since 1980, the heralded development of the Hibernia oil field had not yet materialized, the fishery processing sector has been rescued from bankrupcy through government intervention to create Fishery Products International, a giant crown corporation to replace the private corporations, as recommended in December 1982 by the Task Force on Atlantic Fishieries headed by Michael J. L. Kirby. Furthermore, the Bowaters paper mill, economic backbone of the city of Corner Brook, faced closure and was put on the auction block in October 1983 before it was taken over by Kruger Company Inc. of Montreal in the autumn of 1984. Meanwhile, the Iron Ore Company of Canada has closed its mine at Shefferville in Labrador, and provided its employees with means to migrate.

Since the Hibernia project is central to the current Royal Commission's mandate we shall use it as the centre piece for the following exposition. While Hibernia is far too small to cure Newfoundland's economic problems, it may indeed serve as the political rallying force around which much needed economic change might be negotiated.

The author wishes to acknowledge his debt to the excellent study done Mobil Oil Canada Ltd. in its four-volume *Hibernia Development Project: Environmental Impact Statement* (EIS) which it released in May 1985. In the 400-page Volume IV, its researchers and authors have already updated much of the work done in the Economic Council's 1980 study, and they have laid out an economic development strategy that fits well with many of the Economic Council's recommendations.

The current paper is not a complete update of the Newfoundland Reference. That study involved, over a two and a half year period, more than 55 professionals as researchers, consultants and technical support, to say nothing of the Council's administrative and editorial apparatus and the fine pen of journalist Bruce Little who helped draft the final book. Even with the help of the Council's excellent data processing support, one professor cannot, in a few short weeks and snippets of time between classes, assimilate all that has gone on in Newfoundland since 1980. Nevertheless, some of Newfoundland's current policy concerns, like the fishery and Hibernia, have changed considerably in the past five years and are of such importance to both Canada and Newfoundland, that I have tried to give them very serious attention in two separate essays included in this paper.

I have a special debt to Dr. Alan MacFadyen who chaired the University of Calgary Energy Conference on the Economic Council's Energy Study (January 1985) and who helped me develop an article related to this work (Copithorne, MacFadyen and Bell, 1985). It was Dr. MacFadyen's lectures in petroleum economics and access to his personal library that gave rise to many of the insights developed in the current chapter on Hibernia. Dr. MacFadyen and I both thank Ron Erdmann and his colleagues at Energy Mines and Resources Canada who encouraged us to do more work in this area. The cash flows I develop in Chart 8-1 and Appendix G emanate from earlier scenarios I devised in cooperation with Dr. MacFadyen and University of Calgary students Brian Schellenberg and Janusz Bielecki whose summer work in 1985 was financed by Energy, Mines and Resources Canada under its Research Agreements Program for Universities. I thank both these gentlemen for their assistance. I am especially grateful to Dr. Cor van de Panne whose untiring efforts to introduce new computer techniques at the University of Calgary brought me into contact with the Macintosh and Tandy microcomputers, without which the text, charts and regressions in this paper simply could not have been done with the time and resources available. I thank Dr. Geoffrey Philpots for help in getting started with elementary econometrics on the University mainfram computer.

In footnotes to the following chapter-essays, I acknowledge debts to many persons for specific advice and help in this work. With regard to the overall project, I would like to thank David Slater, Patrick Robert, Serge Dupont, André Bourdon and the support staff of the Economic Council for helping me prepare this work. I alone am responsible for what is written here.

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1. Dr. David W. Slater (1985) "Submission to the Royal Commission on Employment and Unemployment: Newfoundland", Economic Council of Canada (Ottawa) October 28th.

# 1

# SUMMARY

This partial update of the 1980 Economic Council study, *Newfoundland: From Dependency to Self Reliance* was undertaken at the request of the former Chairman of the Economic Council of Canada partly in response to private suggestions from persons concerned with the Newfoundland economy, and partly as preparation of some material which the Chairman submitted to the Newfoundland Royal Commission on Employment and Unemployment in October 1985.

The title of the study was, and remains, a long term hope, not a short term forecast. The Council correctly foresaw some demographic changes in Newfoundland birth rates and dependency rates that have acted to modestly reduce per capita income disparities[1]. There is evidence of favourable changes in directions recommended by the Economic Council. During the five years since the original study was released, however, the Western World has gone through a serious recession that, in Canada, was the worst since the Great Depression of the 1930's. Newfoundland's unemployment rate reached 26.2 per cent in January 1985, the highest level recorded since the province joined Confederation in 1949. The province's balance of payments deficit with the rest of Canada is more than one third of its Gross Domestic Product, a deficit that is primarly made up through federal transfers to persons and to the provincial government in Newfoundland.[2] But as the Economic Council of Canada pointed out in 1980, there are also some very large transfers of income from Newfoundland to the rest of Canada, most notably the annual transfer of hundreds of millions of dollars of economic rent from the Churchill Falls hydo-electric power project in Labrador to Hydro-Quebec under the terms of the 65-year Churchill Falls Power contract.[3] Newfoundland is still receiving less than three mills/kWh on approximately 34.5 billion kWh of electricity produced annually. The average revenue collected by the electrical utility which is using this power is more than 11 times that high.[4]

With the benefit of hindsight, most of the economic analysis reported in *Newfoundland: From Dependency to Self-Reliance* seems to have been correct, and most of the recommendations still follow logically from that analysis. Most of those recommendations remain to be fully realized.

## Geography

Economic disadvantages associated with the geographic pattern of economic activity and the transportation system are improving very slowly.[5] Consistent with the Council's recommendations, a modest form of roll-on, roll-off cargo transfer now exists in St. John's but the transportation system still needs imrovement as is documented in the Hibernia Environmental Impact Statement by Mobil Oil[6]. Economic activity slowly continues to agglomerate in urban centres with workers commuting from their outport homes to jobs in St. John's and other urban centres. But most of the policy-induced deterrents to a more economically viable geographic pattern of economic activity still exist. The Gulf Subsidy and annual loss on the narrow gauge railroad continue to be a large pool of funds--well over $100 million per year in federal transfers locked in by the Terms of

Union--which reinforce an economic pattern that is costly and which works against the economic viability of the provincial economy.[7] The competitive subsidies for different modes of transportation to and within Newfoundland continue to provide controversy, confrontation and Ministerial intervention.[8] The largest single hope on the horizon is that the development of the Hibernia oil field may be used as an opportunity to improve the transportation infrastructure and urban structure in Eastern Newfoundland which may have beneficial effects on reducing costs and increasing productivity.[9]

## The Labour Market

Newfoundland employment growth in 1979-84 was very sluggish, far behind the other regions in Canada (ECC Chart 3-2). Its labour force participation rate remains about ten percentage points below the national average. The tremendous seasonality of Newfoundland labour flows is vividly demonstrated by new data (Appendix E). Many workers leave (or lose) their employment throughout the summer months, especially between August and September at the end of the Cod Glut, with a secondary peak in job departures between October and November when Fishermen's Unemployment Insurance payments begin. Many of these worker move directly out of the labour force, apparently coming directly back into employment again during May through July of the next year without going through a state of unemployment (defined as active job search). Hence much of Newfoundland's joblessness does not get reflected in the unemployment rate, shocking as that statistic is.[10]

In all three provinces studied, a one percent increase in employment will induce a substantive increase in the size of the labour force--about a 0.7 percent increase in Newfoundland and somewhat smaller percentage increases in Ontario and Alberta. This effect is so strong in Newfoundland (where the labour force is about 30 per cent larger than the number of employed workers) that job creation will have almost no effect on the province's measured level of unemployment. In Ontario, by comparison, one must create two jobs to reduce unemployment by one person; but that is still a ten times stronger reduction in measured unemployment than the same policy could achieve in Newfoundland.

Newfoundland is apparently a surge tank for Canadian unemployment. During good economic times, workers leave Newfoundland for Ontario, Alberta and elsewhere; during bad times, this outmigration is arrested and some Newfoundlanders come home again. Hence, unemployed workers get "bottled up" in Newfoundland during recessions. A one percent increase in the employment rate in Ontario will apparently increase Newfoundland outmigration by about 3 1/2 per cent and reduce Newfoundland in-migration by 1 per cent. A one percent increase in the Ontario unemployment rate will apparently curtail Newfoundland outmigration by about 0.6 per cent and may weakly encourage back-migration to Newfoundland (Chapter 4).

It seems that back-migration is an important phenomenon, and that it occurs largely within the same quarter in which the initial migration took place. Evidence suggests that, of persons moving to Newfoundland, only about 18 per cent will migrate out again within the quarter. By contrast, up to 70 per cent of the persons moving to Ontario or Alberta may leave again within three months. It seems possible that the persons migrating to Newfoundland are largely Newfoundlanders coming home to stay, whereas many of the people going to Ontario or Alberta are "seekers of fortune" who do not stay long.

Evidence also suggests that the outmigrants from Newfoundland are preponderantly of working age--largely young persons entering the labour force, whereas most of the in-migrants are not of working age. Evidence suggests that three quarters of Alberta's in-migrants and nine tenths of its out-migrants are working age people whose economic behaviour is strongly influenced by economic opportunities. In-migrants to Ontario tend to be working age, whereas out-migrants are largely not. This evidence suggests that it is young Newfoundland workers who leave the island, sometimes to return with families later. Persons moving to Alberta tend to be workers without children, and those who end up with children are somewhat less likely to leave the province than the childless workers are. People moving to Ontario may tend to be young workers with few dependents, whereas those leaving Ontario may be middle managers taking their families to good jobs in the periferal regions.

As one would expect from the migration results, the supply of labour gets larger in Newfoundland when there is higher unemployment in Ontario, when there are more jobs in Newfoundland, and when local wage rates rise in Newfoundland. The Alberta economy, and to a lesser extent the Newfoundland economy, are more export-oriented than Ontario. The demand for labour seems to be quite inelastic in all three provinces studied; a one percent rise in the local real wage may result in only a 0.2 per cent loss in employment. Hence it makes sense for the Labour Movement to press for wage increases; even though some workers will lose their jobs when wages rise, the total wage bill will apparently increase.

Parity wage adjustment with Ontario is the strongest single hypothesis for wage determination in Alberta and Newfoundland (Table 4-10, 4-11 and 4-13). Other things equal, it seems that a one per cent increase in average weekly earnings in Ontario will translate into at least a 0.5 percent increase in average weekly earnings in Newfoundland and Alberta.

The second strongest factor affecting wage adjustment is the rate of inflation in consumer prices. Whereas the demonstration effect of wage changes seems to be very quick (less than three months) the effect of an increase in the general price level takes about three months to make its impact in Alberta, about six months or more in Newfoundland. A one per cent increase in the level of consumer prices seems to induce at least a 0.3 per cent increase in provincial average hourly earnings within six to nine months.

The combined effects of emulating Ontario's wage increases and catching up to inflation are so large as to account for most of the adjustment in average weekly earnings in both Newfoundland and Alberta. These two factors leave little room for explaining wage adjustments by the effects of local unemployment and job vacancy rates. Nevertheless, there is some evidence that Alberta wages adjustments are sensitive to the relative state of supply and demand in the labour market.

We have yet to find official statistical evidence to indicate that Newfoundland wages have much downward flexibility. Rather, the evidence suggests that, in the face of massive unemployment, Newfoundland's average hourly earnings in manufacturing have risen to briefly exceed national levels in 1984 in those establishments from which Statistics Canada collected the data. The Economic Council's work attitude survey found that, no matter what other variables were introduced into their analysis, Newfoundlanders remained statistically significantly less willing to take wage cuts to get jobs than was true of a random sample of Ontario workers.

Our fixation on Newfoundland's wages emanates not from concerns over "justice" or the income distribution, but from a macroeconomic concern for the long run existence of jobs in the entire Newfoundland economy. Any region that simultaneoulsy manifests massive unemployment and a massive balance of payments deficit (as Newfoundland does) is manifesting the symptoms of a fundamentally overvalued exchange rate. Such regions in the world typically have a combination of lower productivity, higher factor prices and greater transportation cost disadvantages than their international trading partners--disadvantages which can be corrected by a depreciation of the region's currency. For example, such disadvantages have resulted in the value of the Canadian dollar falling to about 70 per cent of the value of the American dollar on international markets. As a result of the currency depreciation, Canadian competitiveness on world markets and Canadian employment levels have been preserved.

Newfoundland is in a similar position relative to the rest of Canada, that Canada is in relative to the United States. Newfoundland needs a devaluation of its currency relative to the rest of Canada to correct for the lower productivity and transportation cost disadvantages of its economy.[11] Since its exchange rate is pegged at parity with the Canadian dollar, it cannot depreciate its currency to make its cost levels competitive with the rest of Canada, or to preserve its employment levels. If the exchange rate cannot be adjusted, then other means are needed to lower Newfoundland's costs--either increases in productivity, or lower factor prices, or both. Many people will perceive Newfoundland's recent wage increases as a good thing--that Newfoundland workers are now receiving justice in the labour market as evidenced by some kind of wage parity with Ontario workers. But increases in wage rates without offsetting increases in productivity will further weaken the long-run viability of Newfoundland employment. Being able to claim wage parity on a job that does not exist is cold comfort.

The single important moderating wage influence of which the author is aware, is the landmark labour agreement recently achieved between Fishery Products International and the Fisherman's Union (Chapter 6). It does not yet appear in the statistics. This four year agreement involves wage increases that are less than the rate of inflation following on the heels of two years in which there were no wage increases. The agreement arises from the ashes of bankrupcy of virtually the entire Newfoundland fish processing industry--the single largest remaining footloose manufacturing industry which could conceivably migrate out of the province if wage rates exceed productivity by too wide a margin. Although, it is too early to tell, some industry sources claim that this new agreement and some of the painful restructuring that has come with it, has been made possible by a fundamental change in the attitudes and understanding of the workers and management in the industry. It does not result from political intervention.

Evidence suggests that both the Ontario and Alberta labour markets are more efficient at matching people and jobs than is true for Canada as a whole (Table 4.9). Common sense suggests that the Newfoundland labour market must have a difficult time matching workers scattered around 6000 miles of coast with the small number of jobs that might be created in various centres. Indeed, statistical regressions cannot even manifest a "people and jobs matching mechanism" for Newfoundland (Table 4.9). Political forces that steadfastly fight against the urbanizing economic forces that would unite the labour market in Newfoundland may not be very constructive either for the economy of the province or for the nation.

The fact that there seem to be so many discouraged workers in Newfoundland probably accounts for the weak showing of the Newfoundland unemployment rate in almost all statistical regressions. As it is currently defined by Statistics Canada, the unemployment rate in Newfoundland is probably not a very accurate measure of the true extent of joblessness. The problem comes from defining 'unemployment' as a state of active job search; in certain rural areas of Newfoundland, everybody knows that, for persons who cannot face the risk of migrating (and losing their access to the regionally extended benefits of unemployment insurance or fishermen's unemployment insurance, for example), there is no point in actively searching for a job during certain seasons.

One needs to be concerned about the counterproductive migration incentives in income maintenance policy. The labour supply in each province studied is significantly related to the extent of unemployment in other provinces to which its workers might migrate, or from which past migrants might return. Migration matters. It is responsive to economic variables. The Economic Council's suggestion that "policies such as those pertaining to regionally extended benefits and differential eligibility requirements for unemployment insurance should be reconsidered with a view to removing incentives or disincentives to migration, whether within provinces or between provinces" (Recommendation 5), is still relevant.[12]

## The Fishery

There are still too many fishermen chasing too few fish.[13] The marginal productivity of labour in the fishery is negative. After a quarter billion dollar "restructuring" rescured the processing from bankrupcy, it may be teetering on the verge of success, but only if governments step in to remove the income maintenance problem of thousands of underemployed fishermen and fish plant workers from the industry's back. It is the income maintenance problem that acccounts for the huge excess of fishermen in the industry in the first place. New income data confirm the Council's fears, and worse: along the northeast coast of Newfoundland and Labrador, income subsidies in the form of Unemployment Insurance Benefits have become a larger source of income on average, than is the income from fishing (New Table 6-2).

But there are optimistic signs documented in Chapter 6 below. Consistent with the Economic Council's recommendations, a new system of 'Enterprise Allocations' seems to be a very successful mechanism for introducing a system of property rights into the offshore fishery. Fish stocks under Canadian management as a result of Extended Fisheries Jurisdiction are recovering slower than hoped, but much better than is occuring in the nearby American or international waters. The productivity of the Canadian trawler fleet has improved dramatically as a result. A new mutual respect and improved communications seems to exist between the management of the new government-owned company, Fishery Products International, and the Fishermen's Union. The company wants to divest itself of 15 of the smaller, more seasonal fish plants so that it can concentrate on establishing an efficient year-round fishery and fish-processing industry that has high productivity, high quality and which can justify good wages. The Union has cooperated in restructuring the industry and, as mentioned above, has accepted an unprecedented four-year contract which includes real wage declines while the industry gets back on its feet.

Whether Fishery Products International can successfully divest itself of the fifteen smaller and more seasonal fish plants that it cannot profitably use, really depends upon whether governments step in to provide alternative income maintenance for the people and communities whose incomes and access to Unemployment Insurance will be cut off if private buyers cannot find a way to turn these plants into economically viable entities.

Statistics indicate that many of these fish plant workers and the fishermen who serve these plants work little more than 10 weeks per year and are fundamentally dependent on Unemployment Insurance for much of their income. If governments do not take action to deal with their plight directly, they may bring the industry to its knees a second time.

The United States Department of Commerce has also ruled that an additional customs duty of 6.85 per cent should be imposed on imports of certain kinds of Canadian groundfish, to offset a long list of 'subsidies'--including the equity injected into Fishery Products International and the Unemployment Insurance benefits paid to the Canadian fishermen and fish plant workers. The current implicit policy of using the Canadian fishery as the "employer of last resort" to disguise unemployment and as a means of distributing income to the needy, is damaging the international access of the industry.

## Hibernia

Since 1979 the prospect of developing the Hibernia oil field has been, and remains, the single brightest hope for raising incomes, employment and productivity in Newfoundland and for reducing the relative size of transfers as a source of government and personal income. The signing of the Atlantic Accord on February 11th gave the Newfoundland Government much of what it was looking for--the right to collect provincial-type revenues from Hibernia as if the oil project were located on provincial lands, even though court rulings have established that offshore oil actually falls under federal jurisdiction.

At the current time, however, great uncertainty surrounds the economic viability of Hibernia. The uncertainty concerns the size of reserves and costs of production as well as future oil prices. On paper, an oil pool that was originally believed to contain as much as $8 billion in economic rent cannot now proceed without making a substantial loss--assuming world oil prices could have been held at $35 Canadian per barrel (as they were before the drastic fall in world oil prices in January of 1986). In current negotiations, the federal government is being called upon to make as many concessions as possible, including rebates of customs duties and excise taxes that might normally be collected from inputs into the project. Since the federal government virtually withdrew from the collection of oil and gas rents when it signed the Western Accord on March 11th and since it did not introduce any new 'profit-related' taxation in its May 23rd budget, federal negotiators have few tools with which to assist the project. Such tax concessions as they grant, may come partly at the reduction of income tax payable in Alberta by the corporations involved in Hibernia.

In the presence of falling world oil prices and rising Newfoundland wages, it is imperative to have a precedent-setting fiscal regime that can be economically resilient--one that will not demand the payment of economic rents that do not exist, and yet one which can collect some economic rents in future if world oil prices should rise, or if offshore oil reserves and production performance should prove better than what the operator currently suggests for Hibernia. The cash flow tax analysed in Chapter 8 is an excellent benchmark against which to measure the performance of whatever fiscal regime is negotiated. Even when applied at rates up to 100 per cent, this tax can never drive the expected value of an oil pool negative. Furthermore, as the tax rate rises upwards from zero, the risk borne by investors declines exponentially. This tax provides a means by which governments can legitimately aid the early stages of an oil venture without giving away the prospect of collecting a substantial amount of economic rent in the long run if there should be any. The tax responds automatically to unforseen fluctuations in project costs or the price of oil, sharing the burdens and reaping the windfalls in proportions determined by the tax rate.

Given the propensity of expanded natural resource endownments to be used to increase the dependency of the labour force on transfers, as has clearly occured in the fishery, one has to be cautious about suggesting that Hibernia will reduce the dependency of the province. Given the current cash flow profile of Hibernia, and the demonstrated tendency of construction jobs to be converted into Unemployment Insurance Benefits, it is not impossible that Hibernia could become a net liability to Canada. The chances of the project proceeding successfully may be greatest if the governments, workers and companies concerned attach as few constraints on the project as possible and establish methods of pricing both the natural resource and the labour as resiliently as possible. A cash flow tax is certainly a resilient method to price the resource. In the presence of true unemployment rates that are far in excess of 25 per cent, one cannot help wondering if a method could be found by which Newfoundland labour could get jobs in Hibernia, even if the current economic outlook is poor. If workers were willing to work for a moderate wage on designated "Hibernia Jobs" plus a share of the economic rents in future (if there are any) it would be possible to hold down the costs of construction while holding out the prospect that workers might ultimately collect world-scale wages in this industry.. The past history of wage movements in Newfoundland and responses to the wage question on the Economic Council's Work Attidude Survey suggest, however, that this idea would be rejected by Newfoundlanders.

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## Notes

1. ECC Table 3-2 shows market income per capita rose from 53.6 per cent of the national averge in Newfoundland in 1978 to 55.1 per cent in 1983. Transfers to persons increased 77 per cent in nominal value but declined in relative terms from 145.3 per cent of the national average to 137.9 per cent--largely because transfers to persons increased dramatically in the rest of Canada as a result of the recession. Birth rates in Newfoundland declined from 19.7 per thousand around 1978 to 15.4 in 1983--now barely above the national average of 15.0. The youth dependency ratio fell from 56.3 in 1976 to 42.3 in 1984, while the national ratio declined from 39.1 to 31.9.

2. New Table 3-2, page 3-8.

3. R.C. Zuker and G.P. Jenkins, *Blue Gold: Hydro-electric Rent in Canada*, Economic Council of Canada, Supply and Services Canada (Ottawa), 1984 roughly estimates the benefit of Churchill Falls to Hydro-Quebec at $548 million in 1980. J.T. Bernard, G.E. Bridges and A.D. Scott, "An Evaluation of Potential Canadian Hydro-Electric Rents", Department of Economics Discussion Paper, University of British Columbia, February 1982 use a somewhat different technique to estimate the annual rents at Churchill Falls in the order of $377 in the same time period. These numbers are quoted, only to demonstrate that independent researchers agree that the economic rents at Churchill Falls are substantial, and far in excess of what is being paid to the province of Newfoundland.

4. See Hydro-Quebec Annual Report 1983.

5. The Urban share of population rose modestly from 57.4 per cent in 1976 to 58.6 per cent in 1981 compared to 75.7 per cent in Canada as a whole, 75 per cent in Alberta or 81.7 per cent in Ontario.

6. See Chapter 2 and Appendix D below.

7. ECC Table 2-2 Update, page 2-6 below. Economic Council studies found that productivity in establishments was most strongly related to returns to scale and the rate of capital utilization--factors that are most readily improved by concentrating economic activity in larger centres where higher volumes of economic activity per estabnlishment can be achieved (ECC 1980 and Copithorne 1981).

8. Pages 2-8 and 2-9 below. See also Globe & Mail reports of January 20th and 23rd 1986.

9. See Chapter 2 and Appendix D.

10. This was an important finding of Postner (1980) which is still true.

11. The current study did not have the resources to revisit the Economic Council's earlier industry productivity studies, but the author is not aware of evidence that the productivity differentials between Newfoundland and the rest of Canada have fundamentally changed since 1980.

12. New evidence by Winer and Gauthier (1982) and the position on income maintenance taken by the MacDonald Royal Commission on the Economic Union and Development Prospects for Canada (1985) are consistent with the Economic Council's earlier position.

13. The Council reported 32,000 licenced fishermen in 1979. This number rose to 35,000 in 1980 and gradually declined to 28,000 in 1983. This is still far above the 14,000 to 16,000 fishermen employed in the industry during many of the years since 1955 (ECC Table 6-2). At the same time the number of weeks of benefits paid under Fishermen's Unemployment Insurance has risen from 160,000 in 1979 to 310,000 in 1983. Only 53,000 to 84,000 weeks of benefits were paid in the 1972-76 period before Extended Fisheries Jurisdiction. Getting more fish certainly resulted in a massive increase in Unemployment Insurance subsidies to fishermen; benefits of less than $6.5 million dollars before EFJ had mushroomed to $52.5 million by 1983 (ECC Table 6-2).

# RESHAPING NEWFOUNDLAND: HIBERNIA AS CATALYST*

Settlement patterns and the spatial structure of economic activity have a major influence on economic efficiency, as Regional and Urban Scientists can testify. Some predominantly rural provinces like Saskatchewan and Alberta have undergone dramatic change in urban structure over the past 75 years without much fanfare. But this issue is a much more delicate political matter in Newfoundland.

In 1980, the Economic Council concluded that, without alterning the places where people choose to live, it would be possible to improve the productivity and economic preformance of the Newfoundland economy if economic activity were allowed to continue its natural consolidation along the Trans Canada Highway in urban centres where businesses can realize returns to scale and higher utilisation of their capital. This consolidation in response to normal market pressures would lower costs and make the jobs created more economically viable. Also, larger centres are capable of sustaining a larger range of economic activities, thereby enriching the economic opportunities for Newfoundlanders.

Mobil Oil's Environmental Impact Statement (EIS) for Hibernia speaks of the St. John's Impact Area, and the Argentia and Come-by-Chance Impact Areas. Its analysis suggests that ,in these areas, Hibernia-based activity will have the kind of economic impact that fits in with the Economic Council's notion of strengthening the urban structure of the provincial economy. Yet the current development plans in the EIS seem to assume that most of the materials for the oil industry will be hauled overland from tidewater back to tidewater, which seems not to be the most economic pattern of delivery.[1] The proposed procurement pattern may involve social costs that are higher than necessary, and reduce the favourable economic impacts that could be realized in its major impact areas. These issues are worth exploring.

## The Current Status of Hibernia [2]

The Hibernia Field is situated about 315 km east-southeast of St. John's in 80 meters of water. The Hibernia Development Project consists of producing oil, treating it at offshore facilities to remove produced water and gas, storing the treated oil in offshore facilities, and transporting it to market by tankers. Gas produced with the oil will be injected back into the reservoir. Production of gas for market is not proposed as part of this project, but may be considered as a separate project at a later date.

The Fixed Production System (EIS Figure 1.2-2) will consist of production facilities mounted on a Gravity Base Structure (GBS). Produced oil would be stored in the GBS and transferred through seabed export lines and two Articulated Loading Platformsto shuttle tankers.

The Fixed Production System will involve a Project Management and Supply Base at St. John's, construction of a Gravity Base Structure near Come-By-Chance, mating of the Gravity Base to the Deck Structure at Cheese Island, and Topsides Assembly and Hook Up at Argentia before the structure is floated out to Hibernia.

**Figure 1.2-2**
**Fixed Production System Components**

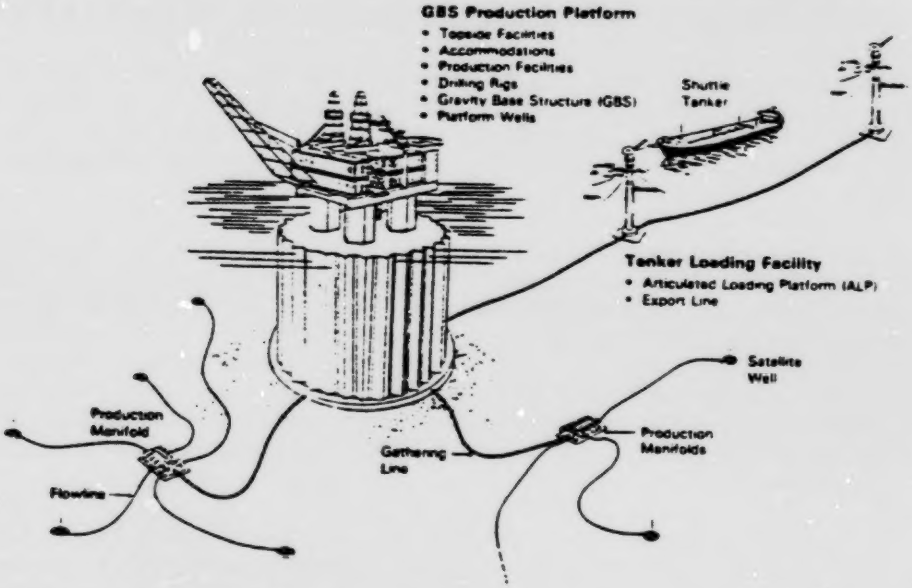
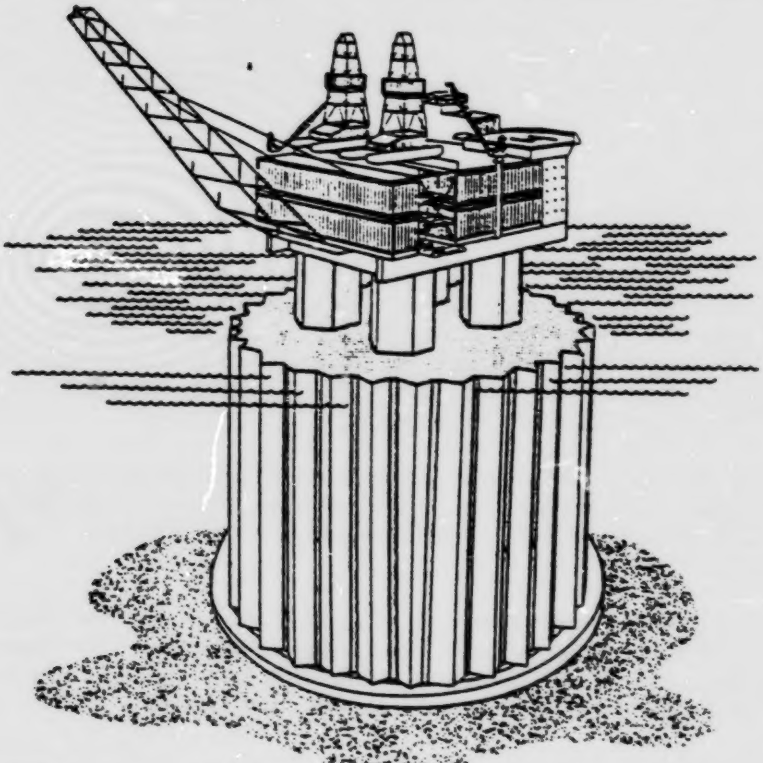

GBS Production Platform
• Topside Facilities
• Accommodations
• Production Facilities
• Drilling Rigs
• Gravity Base Structure (GBS)
• Platform Wells
Shuttle Tanker
Tanker Loading Facility
• Articulated Loading Platform (ALP)
• Export Line
Satellite Well
Production Manifold
Production Manifolds
Gathering Line
Flowline

**Figure 4.1-5**
**Conceptual View of Typical Topside Facilities on GBS Production Facility**



Most of the wells will be drilled at angles from the Gravity Base Structure, but some satellite wells will also be drilled by semisubmersible rigs and connected to the GBS. The Gravity Base Structure will also store oil. It will be constructed from reinforced and post-tensioned concrete. It will have a concrete base slab 111 metres in diameter and be 85 metres high so as to protrude about 5 metres above the average water level.

Approximately 18 months will be needed to establish the work camp, service and supply base facilities to build the Gravity Base Structure in the Come-by-Chance Impact Area at a site on Adams Head, 140 km from St. John's,. The GBS will be assembled there in dry dock for 13 months, then sunk at a deepwater site near the Bread and Cheese Islands for 22 months to allow the topsides and deck frame to be completed. Deck mating will have to occur at the end of a weather window (in October) and tow-out cannot proceed until the beginning of the next weather window (the following June), leaving a period of 8 months for hook-up of mechanical systems at the deepwater site. The total time from start of site development to the completion of offshore installation and ballasting is expected to be almost 6 years. A further eight months will be required to complete offshore hook-up and commissioning of the topside facilities.

The Gravity Base Structure will be built using 290-300 thousand tonnes of aggregate from the Goobies area near Clarenville, 100 thousand tonnes of (improved quality) cement from The North Star Cement Plant in Corner Brook, and 40 thousand tonnes of reinforcement in the 160 to 170 thousand cubic metres of concrete. Sand may come from the mouth of Piper's Hole River, just west of Swift Current. 400 - 420 thousand tonnes of solid ballast will be used.

## Impact Areas

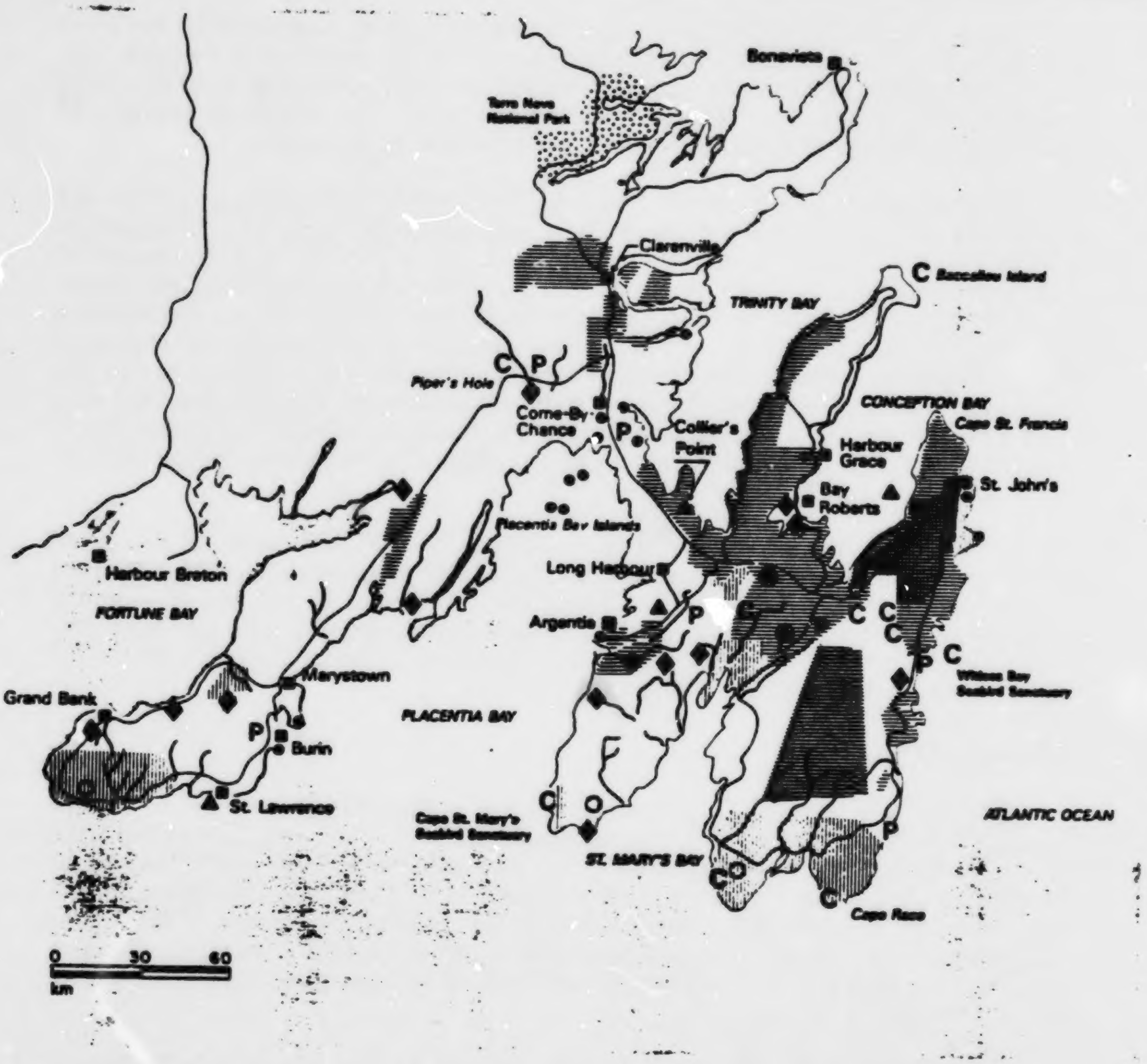
The Environmental Impact Statement identifies three "Impact Areas" in Eastern Newfoundland (EIS Figure 2.8-1) where substantive socio-economic change will take place. The St. John's Impact Area, which has a population of 151,000 people, will be the centre of all project management and supply operations. The Come-By-Chance Impact Area has a population of 6000 people and will be the centre of construction of the Gravity Base System. The Argentia Impact Area, 130 km from St. John's where the flowline fabrication and deck and topsides assembly and hook up will take place has a population of almost 5000 people.

The shipyard at St. Mary's will do some 765 person years of work for the project, and the Cement Plant at Corner Brook and the Gypsum Mine at St. Georges will also be involved, but this work will be done in existing production facilities without causing a significant socio-economic change. (See Mobil's EIS or Appendix D of the current paper for more details on what will happen in these three impact areas.)

## The Economic Council's Position

Historically Newfoundland was settled by fishermen who scattered themselves along 6000 miles of coastline in some 1300 little communities from which they could prosecute the inshore fishery. The major entry points to this seabound economy were Harbour Grace and St. John's from which the migratory fishery in Labrador was serviced and in which the merchants warehoused their goods.

**Figure 2.8-1**
**Land Use; Eastern Newfoundland**


Bonavista
Terra Nova National Park
Clarenville
TRINITY BAY
C Baccalieu Island
Piper's Hole
Come-By-Chance
Collier's Point
CONCEPTION BAY
Cape St. Francis
Harbour Grace
Bay Roberts
St. John's
Placentia Bay Islands
Harbour Breton
FORTUNE BAY
Long Harbour
Argentia
Marystown
Grand Bank
PLACENTIA BAY
Burin
St. Lawrence
Witless Bay Seabird Sanctuary
Cape St. Mary's Seabird Sanctuary
ST. MARY'S BAY
ATLANTIC OCEAN
Cape Race
0 30 60
km

**Legend**

| | | | |
|---|---|---|---|
| — | Highway | ● | Significant Historic or Archaeologic Site |
| ◉ | Cottaging Area | C | Conservation Sites |
| ~ | Scheduled Salmon River | ■ | Wilderness Area |
| P | Provincial Park | ▨ | Productive Forest Area |
| ⁚ | National Park | | Agricultural Development Area |
| ◆ | Aggregate Deposit | O | Fuel Peat Concentration |
| ▲ | Mineral Occurrence | | |

Source: CBCL (1984).

Confederation brought to the province the Gulf subsidy, roads, roll-on/roll-off ferries, refrigerated trucks, direct shipping to Montreal and shopping centres. These did surprisingly little to change the traditional settlement pattern, but they revolutionized the economic pattern and opened up opportunities for increased productivity and improved economic performance.

In 1980, the Economic Council noted that, on the island of Newfoundland, a new spatial structure had emerged that has very important implications for the economy. Historically the main geographic unit of social and economic interaction was the bay. Since 1965, water transport has been replaced by the Trans-Canada Highway and a system of peninsular roads, with the result that bays have been replaced by peninsulas as the dominant socio-economic unit (ECC Map 2-2). The Mobil Oil *Environmental Impact Statement* makes the same observation. Its three "impact areas" are closely related to the St. John's, Clarenville and Argentia "urban systems" identified by the Economic Council.

The core of the island's contemporary spatial structure is the "urban system," which the Council defined to include the 12 most developed urban centres or service centres that are on, or near, the Trans-Canada Highway and the 9 peninsulas that are served by these centres (ECC Map 2-2). This urban sytem contains 75 per cent of Newfoundland's people, putting them within commuting distance of urbanized economic activity. Half of these people live in the 12 service centres and the rest in the peninsular hinterlands. (St. John's exaggerates the split; if that city is excluded, one-third of the remaining urban population live in service centres and two-thirds live in the outlying areas.) Available data for 1966-76 indicate that in the eastern part of the urban system population had been concentrating along the Trans-Canada Highway at the base of the peninsulas. Populations reported by the Economic Council for its "pensinsulas and their service centres", by Mobil Oil for its "impact areas" and some recent population figures for the vicinities of Carbonear and Marystown are shown below.

## Modification of ECC Table 2-1
## Populations Accessible to Certain Service Centres or 'Impact Areas'

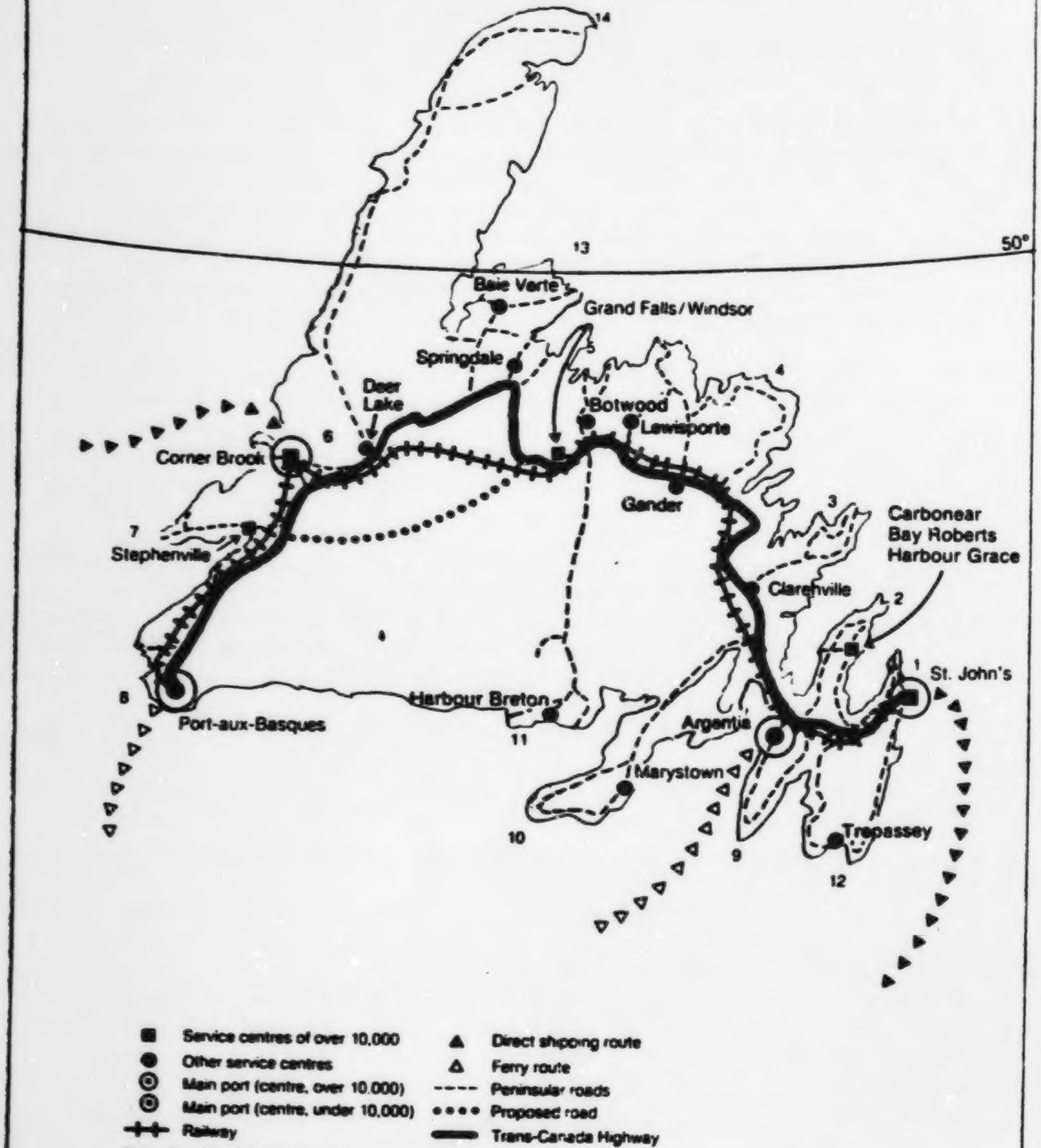
| | Economic Council | Mobil's EIS Statement | |
|---|---|---|---|
| | 1976 | 1976 | 1981 |
| St. John's | 148,836 | 145,400 | 154,820 |
| Carbonear | 49,505 | 33,338.[1] | 35,079.[1] |
| Clarenville | 30,088 | 17,752 | 17,700 |
| Argentia | 10,177 | 10,934 | 10,373 |
| Marystown | 25,320 | 10,543.[2] | 10,993.[2] |

Sources: Economic Council, *Newfoundland: From Dependency to Self-Reliance* Table 3-2, Mobil Oil, *Environmental Impact Statement*, and Census of Canada.

1. Population from Holyrood in the Southeast, to Salmon Cove in the Northeast.
2. Population from Rock Harbour south to Burin.

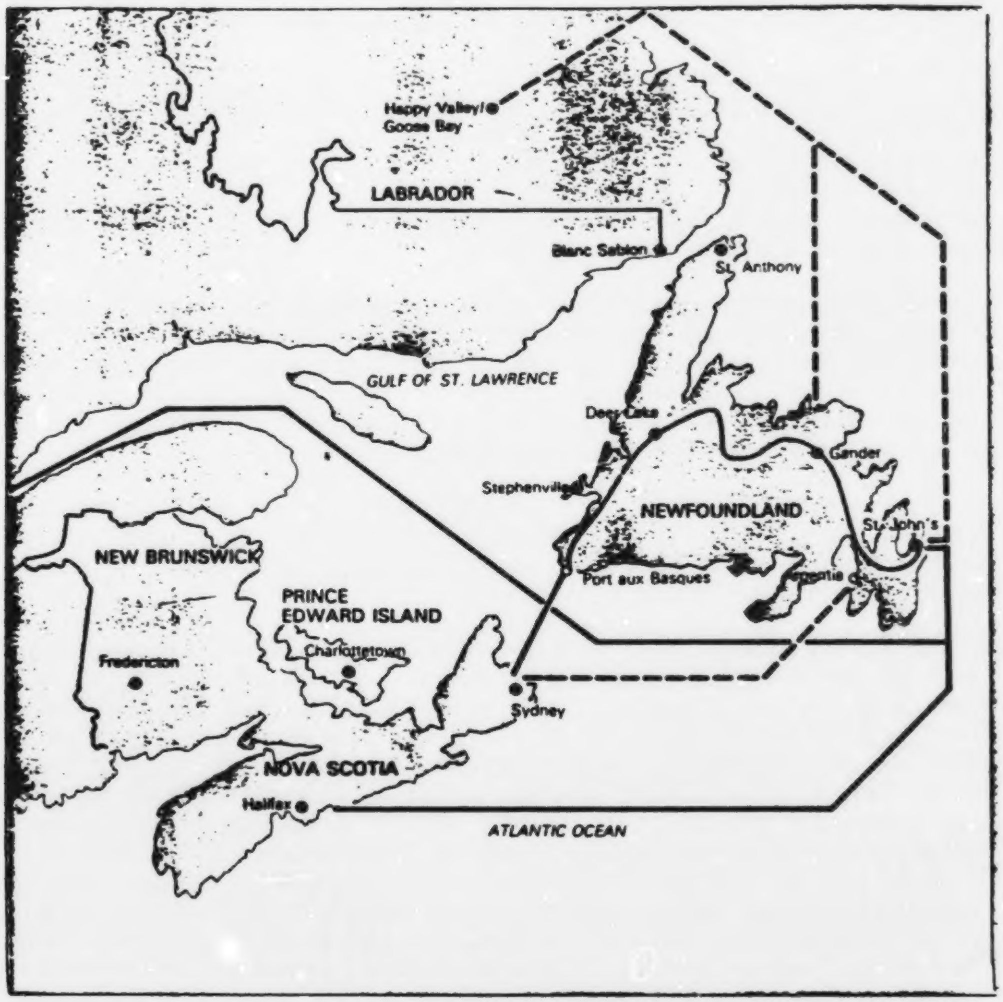
Map 2-2

The Urban System of the Island of Newfoundland


14
50°
13
Baie Verte
Grand Falls/Windsor
Springdale
5
4
Deer Lake
Botwood
Lewisporte
6
Corner Brook
Gander
3
Carbonear
Bay Roberts
Harbour Grace
7
Stephenville
Clarenville
2
1
St. John's
8
Harbour Breton
Port-aux-Basques
11
Argentia
Marystown
10
9
Trepassey
12
Service centres of over 10,000
Other service centres
Main port (centre, over 10,000)
Main port (centre, under 10,000)
Railway
Direct shipping route
Ferry route
Peninsular roads
Proposed road
Trans-Canada Highway

Nos. 1 to 14 Peninsulas and centres, as described in Table 2-1.

Figure 2.6-1
Major Transportation Elements; Newfoundland


Happy Valley/
Goose Bay
LABRADOR
Blanc Sablon
St. Anthony
GULF OF ST. LAWRENCE
Deer Lake
Stephenville
NEWFOUNDLAND
Gander
St. John's
Port aux Basques
rgentia
NEW BRUNSWICK
PRINCE
EDWARD ISLAND
Charlottetown
Fredericton
Sydney
NOVA SCOTIA
Halifax
ATLANTIC OCEAN

**Legend**

━━━ Ferry or Shipping Service: Year-round

━ ━ ━ Ferry or Shipping Service: Seasonal

● Airport

——— Trans-Canada Highway Railway

Source: Karasek-BAE (1984).

## The Productivity Implications of Urban Structure[3]

Regional and urban science research in Canada (ECC 1977, Boisvert 1978) has demonstrated that population growth and measured per capita incomes tend to be larger in major cities than in smaller urban centres and rural areas. The sharpest increases in incomes through urbanization are experienced in going from rural and semi-urban centres to towns of 5,000 - 10,000 people. Some of these gains are more apparent than real because they reflect the monetization of tasks that are performed informally by rural people for themsleves as unrecorded income in kind.

Regional scientists find that the full range of personal, governmental, business and financial services can only flourish in larger centres, and that these services are necessary for strategic decision-making in the economy. Hence large urban centres, especially if they have major industries clustered in their commuting hinterland and if they have fairly frequent and intense interaction with other cities, become centres of innovation; innovation is the source of much of the modern world's economic growth.

Any increase in economic activity and interaction between St. John's and Carbonear (110 km away), Argentia (130 km away), or even Come-By-Chance (140 km west of St. John's), Clarenville and Marystown would help unify the labour market of this entire Eastern Newfoundland region.

Productivity studies (Auer 1979) demonstrate that the value of physical capital per worker in Newfoundland is very high by comparison to the national average. When we personally interviewed several hundred businesses in Newfoundland and Ontario, we confirmed that Newfoundland has a lot of capital per worker--both in the form of large inventories and fixed assets in such industries as construction, bakeries, hotels, wholesale establishments, grocery stores, insurance agents and fish plants. While we frequently found evidence of a lag in the adoption of new technology in Newfoundland by comparison with Ontario, and we frequently found evidence of less education and experience in the Newfoundland labour force, the education, experience and business management factors did not have statistically significant effects on our measures of productivity (although there was sometimes a high correlation between firms with well-educated management and the presence of modern technology and high productivity, notably in the industrial construction industry).

The most powerful influences on productivity we found are the rate of utilization of factors of production and the nature of business organization--whether the establishment was itself an independent business, a cooperative, or part of a multi-divisional or multi-nation corporation.

With respect to policy on productivity, it does not make as much sense to concentrate on the typical capital and loan subsidies as it does to search for ways by which individual business establishments may make use of lower cost scales of plant and to achieve high rates of utilization of those facilities once they are established. Good location of business and government services so as to shorten supply lines and to reach as large a local market as possible becomes keys to higher productivity and lower cost. Larger markets for the individual establishments and higher rates of utilization allow a greater degree of specialization and make it more economic to introduce newer technology.

Many of the benefits of urbanization can be realized by the agglomeration of economic activity without the necessity of concentrating population. As long as Newfoundlanders are willing and able to commute, they can enjoy many of the advantages of urban centres while still living in small communities. It is the economic activity that needs to be concentrated, not people's homes. Sample survey information collected by both the Economic Council and Mobil Oil have independently confirmed that Newfoundlanders are certaining willing to commute--and that they do. Whether they are able to commute to new job opportunities depends partly on the kinds of roads they have and where the economic activity is located.

The Sullivan Commission pointed out that without subsidies most freight would go through Corner Brook and St. John's which constitute the two largest markets in the province. The length of the current transportation system across Nova Scotia to North Sydney, thence by ferry to Port-aux-Basques after which goods still face a 565 mile trip to St. John's, is the inadvertent result of historical accidents, not market pressures. First the Treaty of Utrecht in 1713 reserved the west coast for France, thereby forcing the narrow-guage railway all the way south to Port-aux-Basques for its western terminal. Then the Terms of Union, by which Newfoundland joined Canada, required that Canada take over and maintain the unprofitable Newfoundland railway, steamship and other marine services. The terms required that Canada maintain, in accordance with traffic, a freight and passenger steamship service between North Sydney and Port-aux-Basques, which on completion of a motor highway include suitable provision for the carriage of motor vehicles. For the porposes of railway rate regulation, all through traffic moving between North Sydney and Port-aux-Basques was to be treated as all-rail traffic.

In 1980, the Gulf Subsidy amounted to about $2 000 per unemployed worker in Newfoundland. The loss on the railroad amounted to about $17 000 per railway employee. These subsidies are expensive to Canada, but Newfoundland insists that it keep paying them, and it does not want to contemplate alternative uses for these funds (Peckford, June 12th, 1981). More recent figures are shown in the ECC Table 2-2 Update and New Table 2-1 below.

In 1980 the Economic Council concluded that government can strengthen the urban structure by continuing to locate public services in central places, by encouraging the private sector to do the same, and by improving the road network that now unites the province. Crucial to this process is the development and streamlining of the whole transportation system, including the ports that link Newfoundland's roads to the mainland. Hence two fundamental policy thrusts emerge from this discussion. First, governments should adopt a strategy to reinforce the form of urbanization now occurring on the island of Newfoundland. Second, they should reinforce the role of the Trans-Canada Highway and its main termal ports. Therefore, the Economic Council stated:

**1. We recommend that the Newfoundland government adopt a strategy for the island of Newfoundland that aims to provide services and employment opportunities within commuting distance of most outports on major peninsulas, so that rual people can participate in the market economy without giving up their homes and moving their families. Within each major peninsula, the services, infrasture, and related employment opportunities should generally be located in one or two urban centres on, or very accessible to, the Trans-Canada Highway. The highway should be upgraded to link these urban centres with two major entrance points.**

## ECC Table 2-2 Update
## Transportation Subsidies on Newfoundland Traffic 1977-85

| | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | '85est |
|---|---|---|---|---|---|---|---|---|---|
| | | | | ($ millions) | | | | | |
| Canadian National Railway on Newfoundland railway (express and roadcruiser services) | 27.6 | 28.7 | | | | | | | |
| Losses on Terra Transport since its formation in 1979 | | | 26.8 | 30.1 | 33.4 | 37.2 | 39.7 | 39.6 | 44.9 |
| Testing & Evaluation (containerization) | | | | 7.9 | 11.7 | 20.4 | 12.9 | 11.4 | |
| Labour Assistance (early retirement etc.) | | | | | 0.9 | 1.4 | 1.2 | 1.6 | |
| Transport Canada expenditures: | | | | | | | | | |
| Gulf service | 48.6 | 54.5 | 32.9 | 36.4 | 39.5 | 43.1 | 44.6 | 48.9 | |
| Gulf Rail | | | 23.4 | 20.4 | 21.1 | 20.8 | 20.8 | 23.9 | |
| Argentia service | 2.2 | 7.2 | 6.8 | 9.0 | 7.4 | 6.6 | 6.4 | 7.6 | |
| Coastal boat service | 25.5 | 28.8 | 26.4 | 30.2 | 35.2 | 38.6 | 35.4 | 33.1 | |
| Strait of Belle Isle | | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 1.1 | |
| Coastal ferries | 2.1 | 1.3 } | 1.4 | 1.5 | 1.7 | 2.0 | 2.1 | 2.3 | |
| Other coastal and Gulf subsidies | 1.1 | 1.1 } | | | | | | | |

Source: Unpublished Data from Transport Canada

## New Table 2-1
## Equivalent Manpower Count for Terra Transport

| Year | Manpower |
|---|---|
| 1979 | 1318 |
| 1980 | 1287 |
| 1981 | 1212 |
| 1982 | 1057 |
| 1983 | 954 |
| 1984 | 901 |
| March 1985 | 836 |

Source: Terra Transport, via Transport Canada

**2. We recommend that the federal government expand and upgrade the harbour facilities in the St. John's area in the east and at a single point in the west, to facilitate handling of containerized and roll-on/roll-off cargoes. It is important that the western port selected be a large urban centre, chosen to minimize the length of highway needed to connect it to major peninsular centres and St. John's.**

**3. We recommend that the federal and provincial governments immediately enter into negotiations to establish a federal financial obligation to the Newfoundland government in place of the existing Gulf subsidy. They should also arrange to finance the adjustment of any workers directly affected by this action.**

In the years that have passed since the Council made these recommendations, the transportation volume has remained about constant at 900 000 tonnes per year, most of it going by ferry to Port-aux-Basques where it is split about evenly between rail and highway truck. Some direct shipping remains from both Montreal and Halifax. The Halifax service is weekly service by Atlantic Searoute Ltd. (ASL). ASL was created around 1982 by the merger of former competitors, Newfoundland Containers, and Federal Comerce & Navigation. Goods travelling by truck via North Sydney-Port aux Basques can reach St. John's a couple of days sooner than if the miss the weekly trip from Halifax via ASL. Hence, shippers do have some benefit in timeliness by using the highway route.

ECC Table 2-3
General Freight Traffic to Newfoundland, Selected Years, 1968-85

| Year | Ferry Traffic | | Direct Shipping | Total |
|---|---|---|---|---|
| | Rail | Truck | | |
| | % | | | thousand tonnes |
| 1968 | 66.6 | 4.1 | 29.3 | 614 |
| 1971 | 60.6 | 7.0 | 32.4 | 685 |
| 1975 | 52.5 | 19.9 | 27.6 | 908 |
| 1976 | 44.7 | 27.8 | 27.5 | 856 |
| 1977 | 38.5 | 31.1 | 30.4 | 875 |
| 1978 | 31.4 | 33.6 | 34.9 | 904 |
| 1979 | 28.5 | 30.9 | 40.6 | 956 |
| 1980 | 26.1 | 30.9 | 43.0 | 929 |
| 1981 | 24.3 | 33.0 | 42.7 | 915 |
| 1982 | 28.2 | 32.7 | 39.1 | 850 |
| 1983 | 36.0 | 32.4 | 31.7 | 918 |
| 1984 | 37.8 | 32.6 | 29.6 | 916 |
| 1985 est. | 34.8 | 34.4 | 30.9 | 906 |

Source: Water Transport Assistance Directorate, Transport Canada

The Government of Canada has continued to pay the Gulf Subsidy as is required by the Terms of Union. Canadian National has been covering the operating losses of TerraTransport, its subsidiary, which operates the narrow-guage railroad. It appears that the railway operating losses have become a CN responsibility as a consequence of a letter accompanying the Terms of Union (See Sullivan Commission, 1978, Volume I, Page 33). The Government of Canada has provided about $70 million in capital and labour assistance by which CN is moving to containerize all rail freight to facilitate transshipment, and CN is building a huge, high speed ferry, The *Caribou*, which will replace the existing car ferry and make the existing rail ferry unnecessary. As an economy measure, the Ro-Ro Ferry service to Argentia has been cut back to a single vessel, the *Ambrose Shea* , sailing during the summer. A plan to replace the current six vessel fleet with a three vessel configuration which could also serve Argentia in summer, was originally scheduled for 1986 but the precise date is now being re-evaluated. (The *Caribou* is the first of the three new vessels.)

What is of current significance is that the Hibernia Project, as described in the Environmental Impact Statement, provides a unique opportunity to capitalize on transportation improvements that would strengthen the urban structure of Eastern Newfoundland. What is quite remarkable is that the authors of the Environment Impact Statement did not suggest, or even hint, that it would be advantageous to float all their tonnage direct to tidewater at Adam's Head, Argentia and St. John's where virtually all of their economic activity is to take place. Even though 100 percent of their freight has to be loaded onto a vessel to get to Newfoundland, they seem to have been willing to accept the prospect that most of it should be landed at the extreme southwest tip of Newfoundland and be hauled some 480-565 miles to the opposite end of the island before delivering it at tidewater again.

Similarly, the authors of the EIS talk about needing workers in St. John's and large temporary labour forces at Adams Head and Argentia which they expect to be partly housed in two company work camps, with the rest being commuters. But the authors do not explicitly recognize that they need a modern, high-speed highway access to the large labour force dormatory in the Carbonear, Harbour Grace region which accomodates some 50,000 additional people less than 100 kilometres from all three work sites. If governments were to build a high speed modern highway from Carbonear south with one branch leading to St. John's and the other leading west to Argentia and Come-By-Chance areas, is it conceivable that much of the labour supply problem would be solved, and much of the work camp costs avoided? The long term legacy for improving the productivity and economic performance of the urban structure of the Avalon Peninsula would pay dividends for decades to come--exactly what the Economic Council was trying to achieve in its original urban structure recommendations.

TerraTransport has begun revitalization of the railway by implementing a containerization program (mentioned above), using funding of $67 million from the federal government for its "Testing and Evaluation" Program. The program has modernized operations by establishing container terminals at Corner Brook, Grand Falls, and St. John's and purchasing intermodal containers for use by the company. It has also financed container-loading facilities in Quebec and Ontario that are dedicated to the Newfoundland rail traffic. Through aggressive marketing proceedures and service improvements made possible by the container system, the railway has been successful in regaining some of the freight previously lost to competing modes of transportation. Direct shippers have protested the low freight rates charged by CN Rail on Newfoundland traffic to maintain its share of the volume of freight (see below).

The Railway has also reduced the person-years of labour on the Newfoundland railroad from 1318 in 1979 to 836 in March 1985. This has been achieved with a $10 million Labour Assistance Program to facilitate early retirement, severance, retraining and relocation of surplus manpower. One should not conclude, however, that TerraTransport has only 836 employees; it retains a much larger number of people on a part time basis through its "spare-boarding". An attempt to reduce the actual number of employees involved would curtail the access that many of them have to Unemployment Insurance.

In the sumer of 1982, Atlantic Container Express Inc. (ACE), the container shipping service from Montreal to Newfoundland, alleged that CN was engaging in predatory pricing on Newfoundland traffic. In September, 1982, the Minister of Transport ordered the Canadian Transport Commission to determine whether traffic movements to and from Newfoundland were compensatory as defined in Section 276 of the Railway Act. In May and August, 1983, the CTC issued interim orders to adjust upward rates on some 38 of 177 movements investigated, subject to more detailed review by the Commission. Basic disagreement arose between CN Rail and the CTC on the appropriate methodology for costing. The CTC held public hearings in Montreal and St. John's in October, 1984. CN then applied for leave to appeal to the Federal Court of Appeal the Committee's ruling regarding cost disclosure to their competitors.

In December 21st, 1984, CTC issued Interim Order R-37611 raising rates on 128 or 177 tariff items investigated and determined uncompensatory rates on some items must end effective January 11, 1985, with the remaining CN tariff items to be readjusted on February 19th, 1985. (The order is interim pending outcome of the appeal.) The weighted average rate increase on all traffic was 19.2%.

On January 11th, 1985, CN applied for a stay of execution of the Order by the RTC, a review of the Order by the CTC Review Committee and petititoned the Governor-in-Council to vary or rescind the order. Consequences for CN Rail/TerraTransport are not clear. Over the longer term, CN has predicted a significant traffic diversion to ACE and trucking. The Province, several shippers and CN unions and the public at large have written the Minister for Intervention. The Railway Transport Committee rejected CN's request for a stay of the order and the Review Committee decided not to review RTC's order of December 21, 1984.

On February 19th, 1985, in advance of the Newfoundland election, the Federal Cabinet over-ruled the CTC order: the Governor-in-Council postponed the implementation dates of CTC Order R-37611 until CN's appeal to the Federal Court of Appeal is determined and the CTC issues a final order on the matter. The Federal Court has ruled against CN and the CTC has scheduled the hearing to resume on September 9th, 1985 in Montreal. As of January 1986, the future of the Newfoundland railway is being considered at the political level.

With regard to the direct shipping subsidy, the subsidy contract with Newfoundland Steamships Limited (NSL) was bought out on the Montreal-St. John's direct shipping line. Shortly thereafter Newfoundland Capital Corporation purchased NSL and a merger with Atlantic Freight Lines followed quickly. The new company, Atlantic Container Express (A.C.E.) continued to operate the Montreal- St. John's route but found itself unable to continue the stop in Corner Brook. A period of intense competition followed which saw the direct shippers lose market share to the railway (as mentioned above). A direct shipping subsidy was re-introduced, costing $6.2 million over the first 20 months of operation in 1984-85 (ECC Table 2-2). Public money is being used to subsize both sides in this price war.

It is strange that Mobil Oil's Environmental Impact Statement never mentions requesting direct Ro Ro ferry service to Argentia when almost all its work has to take place on the Avalon Peninsula. If virtually all the freight for the Hibernia project has to be used within 100 miles of St. John's, why not ship it there directly? Why insist on minimizing the amount of cheap ocean travel while maximizing the amount of mileage the goods have to travel, maximizing the number of trucks used, maximizing the amount of damage to one of the longest and most expensive stretches of TransCanada Highway in the nation?

## Demographic and Property Value Effects of Hibernia

While most of the details on the urban structure impact of Hibernia are relegated to Appendix D, that appendix contains important evidence about speculative migration and speculative movements in retail values, largely drawing on the lessons of the other leading oil province, Alberta. The Economic Council had been concerned about both back-migration and property speculation in its 1980 study and it made some recommendations to combat property value speculation--recommendations which the Provincial Government has largely implemented. If the development of the Hibernia Project is not well managed, the potential for speculative booms and busts in the St. John's housing market is daunting. St. John's house prices have already inflated by almost 25 per cent in 1980, only to fall back again when the expected development of Hibernia did not occur. In Alberta that last decade is testimony to massive in-migration to an overheated economy, followed by large-scale out-migration and collapse of property values when expected oil revenues where taken away by the National Energy Program, the world-wide recession of 1982, and the decline in world oil prices. Although the Hibernia Environmental Impact Statement claims that the small amount of employment involved in Hibernia need not have much impact on net population movements and that marginal investments in additional housing should allow the Hibernia development to have very little effect on inflation and property values, the recent house price experience in St. John's and the massive mortgage foreclosures in Alberta demonstrate that there is great potential for wreaking havock with the net worth of thousands of individual citizens.

The Environmental Impact Statement treats migration much as if the company were managing the provincial economy like a work camp: there are only so many jobs to be filled; there is a need for modest in-migration of certain skilled people during the peak of construction, and a need for modest out-migration afterward. The total numbers of people who need to migrate into the impact areas is less than 1000 persons. In reality, migration is strongly motivated by hopes of receiving jobs and high incomes, even if the prospects are poor. Evidence from other migration studies (Winer & Gauthier 1982) and the experience of Alberta suggests that the amount of "speculative migration" as the EIS calls it, may be substantial.

A different mind set is needed concerning migration; in-migration should not be viewed as having unneeded persons in the work camp; it should be regarded as having a larger economy--a larger market to serve--which can lead to modest agglomeration economies and some economic development. It is possible that a successfully managed Hibernia Development will indeed cause in-migration of a larger order than the EIS authors foresee, but that the influx of new population will bring enough new market with it to create some jobs of their own. Then, the advent of a better skilled workforce after Hibernia may create some opportunities to produce more home goods and exportables after the oil pool has passed its peak production.

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## Notes

* The Economic Council (November 19th, 1980) presented a chapter on offshore oil and gas that attempted to ascertain the possible effect of the Hibernia oil and gas discovery on the Newfoundland economy. Because time lags in publishing did not permit the Council time to react to the National Energy Program (October 28th, 1980), the Council released a subsequent authored discussion paper on Hibernia (Wilby 1981). It also dealt with energy revenues in its consensus document on *Financing Confederation* (1982) and supporting studies on Equalization (Boadway and Flatters 1982) and the effects of natural resource revenues on migration (Winer and Gauthier 1982). The Council revisited the Hibernia issue in a discussion paper by Eglington and Uffelmann (1983), a consensus document on Energy Policy (1985), and a conference in Calgary (*Canadian Public Policy* XI, Supplement, July, 1985).

1. One provincial official has suggested that one might interpret the Environmental Impact Statement as the *maximum* economic impact that Hibernia *could have* on the provincial economy, and that one should not assume that the actual pattern of procurement will occur exactly as suggested in the EIS.

2. The current text freely borrows, sometimes verbatim without formal attribution, from both the Economic Council study, *Newfoundland: From Dependency to Self-Reliance*, 1980 and Mobil Oil's *Environmental Impact Statement*, 1985.

3. This section is largely borrowed from Copithorne, 1981.

4. Recall footnote 1.

## 3

# DISPARITIES AND DEPENDENCE

## AN UPDATE

In 1980, the Economic Council documented the socioeconomic evidence of Newfoundland's economic situation in a chapter that looked at the regional disparities between Newfoundland and the rest of Canada, and between Newfoundland and some other provinces. In this chapter, we return to these measures to see what changes have taken place in five years.

### Demography and Migration

At 15.6 live births per 1000 population, the birth rate has fallen rather dramatically in Newfoundland (by 16 percent since 1979) so that it is now close to the national average and below the Prairie provinces. (Because Alberta received so many young in-migrants of child-bearing age during 1976-81, Alberta has now surpassed Newfoundland (by some 27 percent) as the province with the highest birth rate and rate of natural population increase (ECC Table 3-1). In addition to the decline in birth rate, Newfoundland has continued to have the largest rate of new out-migration of any province so that its population is one of the slowest growing. As a legacy of its historically high birthrates, however, Newfoundland still has the largest families of any province, and the largest youth dependency ratio. Nevertheless, the youth dependency ratio has fallen 25 percent between 1976 and 1984. Although the combined burden of young and old people per working age person is still above the national average in Newfoundland, the ratio is now close to where the Canadian average was ten years ago, and Newfoundland is no longer the province with the largest relative burden of dependency-aged people. As the Economic Council predicted in 1980, Newfoundland's demographic structure has changed favourably so as to reduce the number of mouths to be fed by each working age person.

Newfoundland continues to have large net out-migration on average, although there are great fluctuations from year to year (See ECC Chart 3-1). The pattern of in- and out-migration continues to be linked to the availability of jobs in other provinces (see Chapter 4). Newfoundland continues to attract less than 0.5 percent of the immigrants coming to Canada.

### Employment, Unemployment and Labour Force Participation

Employment growth has been much slower in Newfoundland than in most other parts of Canada during 1979-84 (ECC Chart 3-2). The labour force participation rates are roughly the same as they were in 1979, about 65 per cent in Canada as a whole, and about 53 per cent in Newfoundland (ECC Charts 3-3A and 3-3B). Newfoundland/Canada unemployment rate disparities have moved from 15.4 % / 7.5 % in 1979 to 20.5% / 11.3 % in 1984. (See New Chart 3-1) Whereas unemployment rose 3.8 percentage points in Canada as a whole, it rose 5.1 percentage points in Newfoundland. This piling up of unemployed workers in Newfoundland is typical of past relationships (see Chapter 4).

## Income, Wage and Wealth Disparities

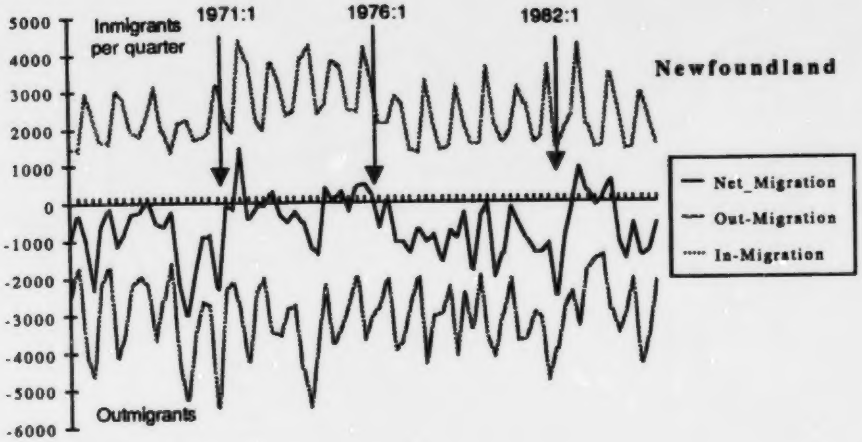
ECC Table 3-2 reveals that there was some modest reduction in the per capita income disparities between 1978 and 1983--partly because Newfoundland's dependency ratios improved and partly because transfers like unemployment insurance grew faster in the rest of Canada during the recession than they did in Newfoundland. At any rate, the Newfoundland/Canada ratios rose from 53.6 to 55.1 in market income, from 66.0 to 67.8 in total personal income, and from 67.9 to 71.0 in personal disposable income. These per capita income improvements came in spite of the fact that Newfoundland unemployment rates were escalating by more percentage points than in the rest of Canada during the recession. If Newfoundland's unemployment rate truly refects the cyclical migration of Newfoundland workers in and out of employment in the rest of Canada, then it is

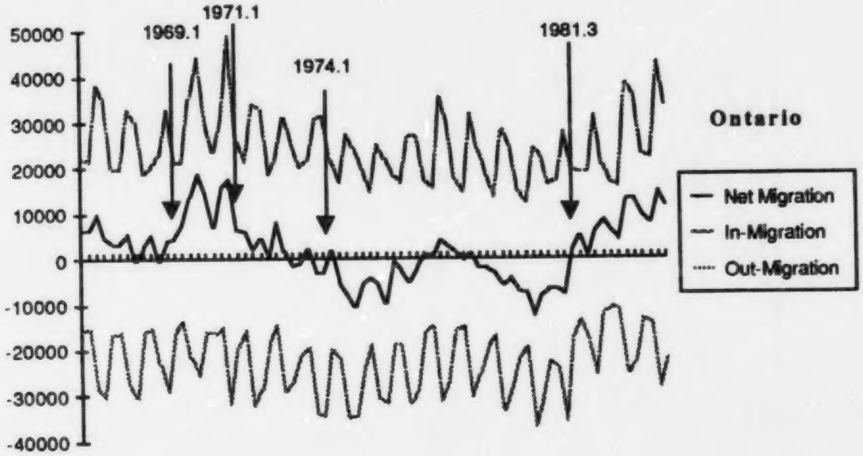
### ECC Table 3-2
### Income per Capita, Canada and Selected Provinces, 1983, 1978

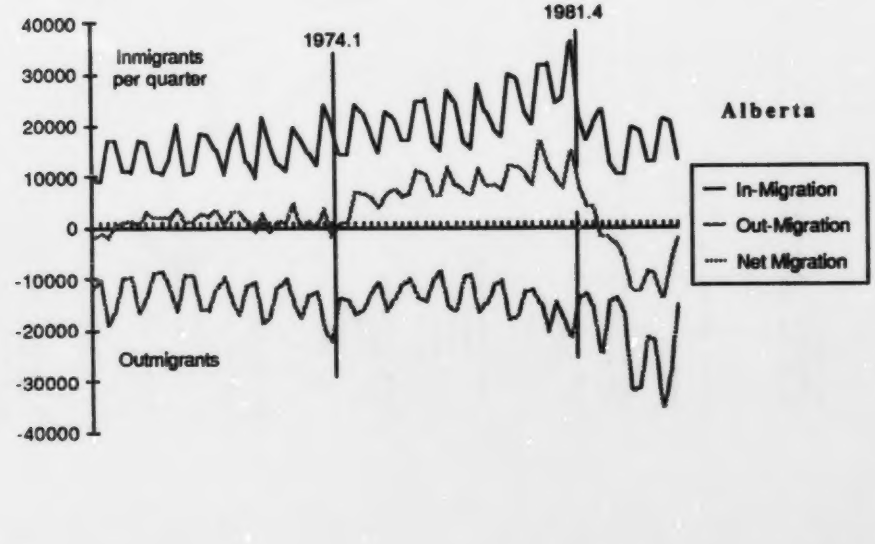
| | 1983 | | | | 1983 | 1978 | 1983/1978 Ratio | |
|---|---|---|---|---|---|---|---|---|
| | Ontario | Nova Scotia | Nfld. | Canada | Nfld/Can Ratio | Nfld/Can Ratio | Nfld | Canada |
| Market Income | 12,951 | 8,721 | 6,304 | 11,434 | 55.1 | 53.6 | 1.70 | 1.65 |
| Wages, Salaries and supplementary labour income | 10,150 | 7,003 | 5,245 | 8,885 | 59.0 | 58.6 | 1.60 | 1.59 |
| Net income from farm production | 98 | 63 | 14 | 128 | 10.9 | 2.7 | 3.5 | -.15 |
| Net income of non-farm unincorporated business | 792 | 711 | 523 | 737 | 70.9 | 57.7 | 2.22 | 1.80 |
| Interest, dividends, and misc. investment income | 1,911 | 943 | 523 | 1,684 | 31.0 | 25.1 | 2.68 | 2.17 |
| Transfers to persons | 1,749 | 2,071 | 2,760 | 2,001 | 137.9 | 145.3 | 1.77 | 1.86 |
| From the Federal Government | 1,029 | 1,405 | 1,507 | 1,132 | 133.1 | 142.9 | 1.70 | 1.82 |
| Major Components: | | | | | | | | |
| Family allowance | 90 | 95 | 118 | 93 | 127.6 | 126.3 | -.02 | -.02 |
| Unemployment insurance benefits | 323 | 462 | 795 | 407 | 195.5 | 228.5 | 1.80 | 2.11 |
| Old age security | 393 | 510 | 413 | 407 | 101.4 | 92.8 | 2.00 | 1.83 |
| From provincial government | 450 | 411 | 1,130 | 653 | 173.2 | 171.4 | 1.80 | 1.78 |
| Personal income | 14,784 | 10,889 | 9,179 | 13,532 | 67.8 | 66.0 | 1.73 | 1.68 |
| Disposable income | 11,974 | 8,990 | 7,700 | 10,845 | 71.0 | 67.9 | 1.73 | 1.66 |

Source: Calculations by Statistical Staff, Economic Council of Canada

# ECC Chart 3-1
# Quarterly Migration, 1961.1 - 1984.1







ECC Table 3-1
Demographic Characteristics
By Province, 1966 to 1984

| | Canada | Newfound-land | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatche-wan | Alberta | British Columbia | Yukon | Northwest Territories |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | (Thousands) | | | | | | |
| Estimated population, June 1, 1984 | 25127.9 | 579.5 | 125.3 | 869.9 | 713.3 | 6549 | 8937.4 | 1056.5 | 1006.2 | 2348.8 | 2870.7 | 21.8 | 49.4 |
| Persons per square kilometer, 1984 | 2.73 | 1.56 | 22.14 | 16.46 | 9.97 | 4.82 | 9.75 | 1.93 | 1.76 | 3.68 | 3.22 | 0.04 | 0.02 |
| | | | | | | | (Per cent) | | | | | | |
| Urban population as a proportion of total population, 1981 | 75.7 | 58.6 | 36.3 | 55.1 | 50.7 | 77.6 | 81.7 | 71.2 | 58.2 | 77.2 | 78 | 63.9 | 48.1 |
| Population growth (1) | | | | | | | | | | | | | |
| 1966-71 | 7.8 | 5.8 | 2.9 | 4.4 | 2.9 | 4.3 | 10.7 | 2.6 | -3.1 | 11.3 | 16.6 | 27.8 | 21.2 |
| 1971-76 | 6.6 | 6.8 | 5.9 | 5 | 6.7 | 3.4 | 7.3 | 3.4 | -0.5 | 12.9 | 12.9 | 18.5 | 22.4 |
| 1976-81 | 5.9 | 1.8 | 3.6 | 2.3 | 2.8 | 3.3 | 4.4 | 0.5 | 5.1 | 21.7 | 11.3 | 6.4 | 7.3 |
| 1981-84 | 3.2 | 2.1 | 2.3 | 2.7 | 2.4 | 1.7 | 3.6 | 3 | 3.9 | 5 | 4.6 | -6 | 8.1 |
| Through natural increase (1) | | | | | | | | | | | | | |
| 1966-71 | 5.4 | 9.9 | 4.8 | 4.9 | 5.7 | 5 | 5.4 | 5.1 | 5.1 | 7.2 | 4.7 | 10 | 17.7 |
| 1971-76 | 4.3 | 7.8 | 4 | 4.1 | 5.2 | 3.7 | 4.3 | 4.6 | 4.1 | 5.9 | 3.8 | 9 | 13.5 |
| 1976-81 | 4.3 | 6.6 | 3.9 | 3.3 | 4.3 | 4.3 | 3.7 | 4 | 4.9 | 6.7 | 3.8 | 8.2 | 12.2 |
| 1981-84 | 2.5 | 3.2 | 2.3 | 1.9 | 2.3 | 2.2 | 2.1 | 2.3 | 2.9 | 4.3 | 2.5 | 5.2 | 6.8 |
| Through net migration (1) | | | | | | | | | | | | | |
| 1966-71 | 2.3 | -4.1 | -1.9 | -0.5 | -2.8 | -0.7 | 5.3 | -2.5 | -8.2 | 4.1 | 11.9 | 16.7 | 3.5 |
| 1971-76 | 2.3 | -1 | 1.9 | 0.9 | 1.5 | -0.3 | 3 | -1.2 | -4.6 | 7 | 9.1 | 9.4 | 8.9 |
| 1976-81 | 1.6 | -4.8 | -0.3 | -1.1 | -1.5 | -1 | 0.7 | -3.5 | 0.2 | 15 | 7.4 | -1.7 | -5 |
| 1981-84 | 0.8 | -1.1 | 0 | 0.8 | 0.1 | -0.5 | 1.5 | 0.6 | 1.1 | 0.7 | 2.1 | -11.3 | 1.3 |
| | | | | | | (Per | thousand | population) | | | | | |
| Birth rate, 1984 | 15.1 | 15.6 | 15.2 | 14 | 15.1 | 13.8 | 14.5 | 13.8 | 16.3 | 19.8 | 15.4 | 23.4 | 23.2 |
| Family size, 1981 | | | | | | | (Persons) | | | | | | |
| Number of persons | 3.3 | 3.8 | 3.5 | 3.3 | 3.4 | 3.3 | 3.2 | 3.2 | 3.3 | 3.3 | 3.1 | 3.3 | 4 |
| Number of children | 1.4 | 1.9 | 1.6 | 1.5 | 1.5 | 1.4 | 1.3 | 1.4 | 1.4 | 1.4 | 1.2 | 1.4 | 2.2 |
| Dependency ratios, 1984 (2) | | | | | | | (Per cent) | | | | | | |
| Youth | 31.9 | 42.3 | 37.9 | 33.4 | 36.1 | 30.1 | 30.7 | 34.7 | 38.3 | 34.7 | 30.7 | 36.1 | 50.8 |
| Old Age | 14.9 | 12.8 | 19.8 | 17.2 | 16.2 | 13.5 | 15.3 | 18.8 | 19.4 | 11.1 | 17 | 5.2 | 4.1 |
| Youth combined with old age | 46.8 | 55.1 | 57.6 | 50.7 | 52.3 | 43.6 | 46 | 53.5 | 57.7 | 45.8 | 47.7 | 41.3 | 54.9 |

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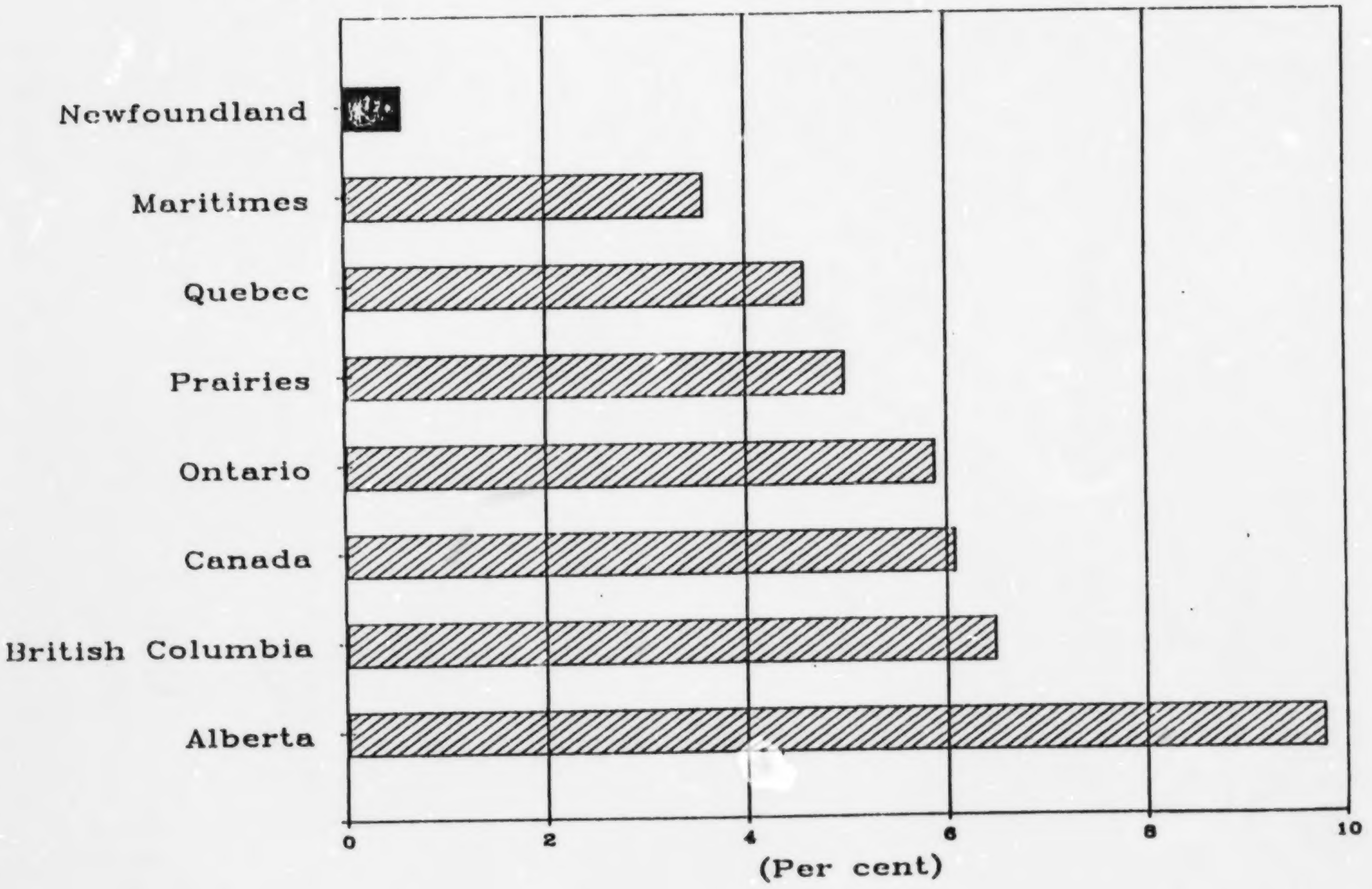
(1) Population growth rates are calculated on a June 1 - May 31 basis.
(2) Youth dependency ratio is 100 times the ratio of the number in 0-14 age group to those in 15-64 group. Similarly for old age group, 65 and over.

ECC Chart 3–2

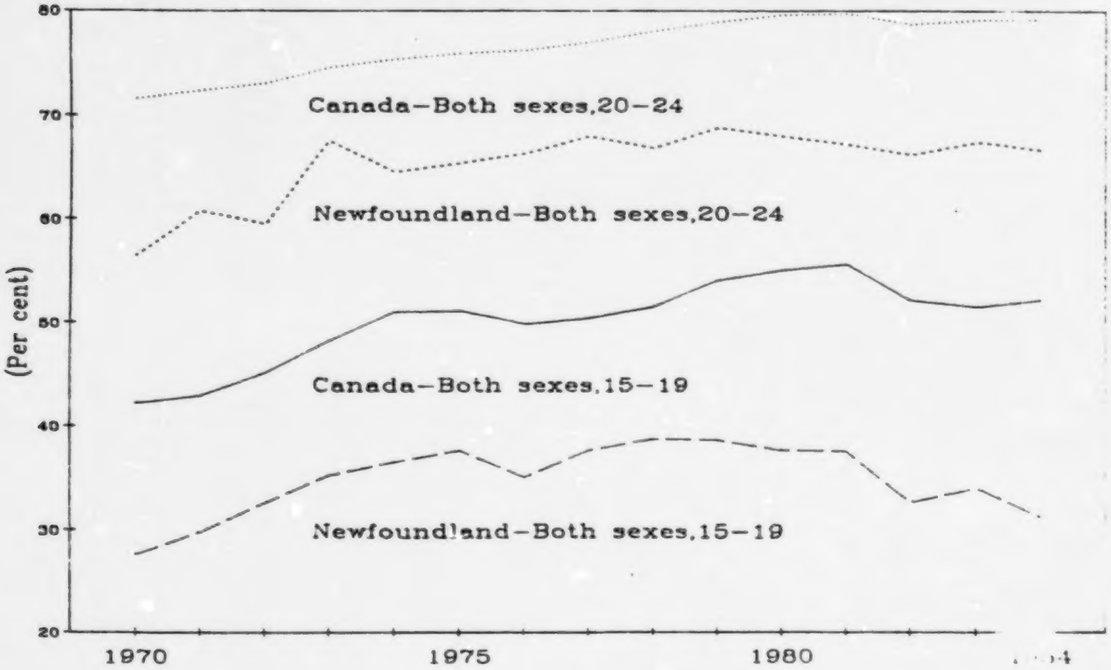
## Employment Growth, by Selected Regions

1979 – 1984

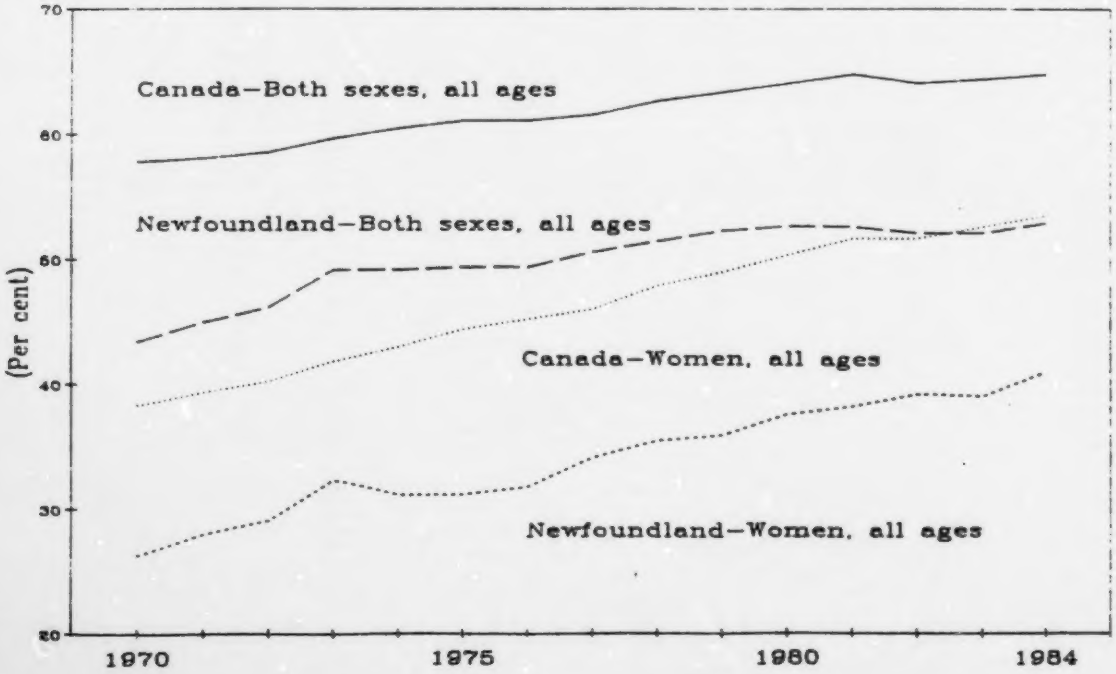


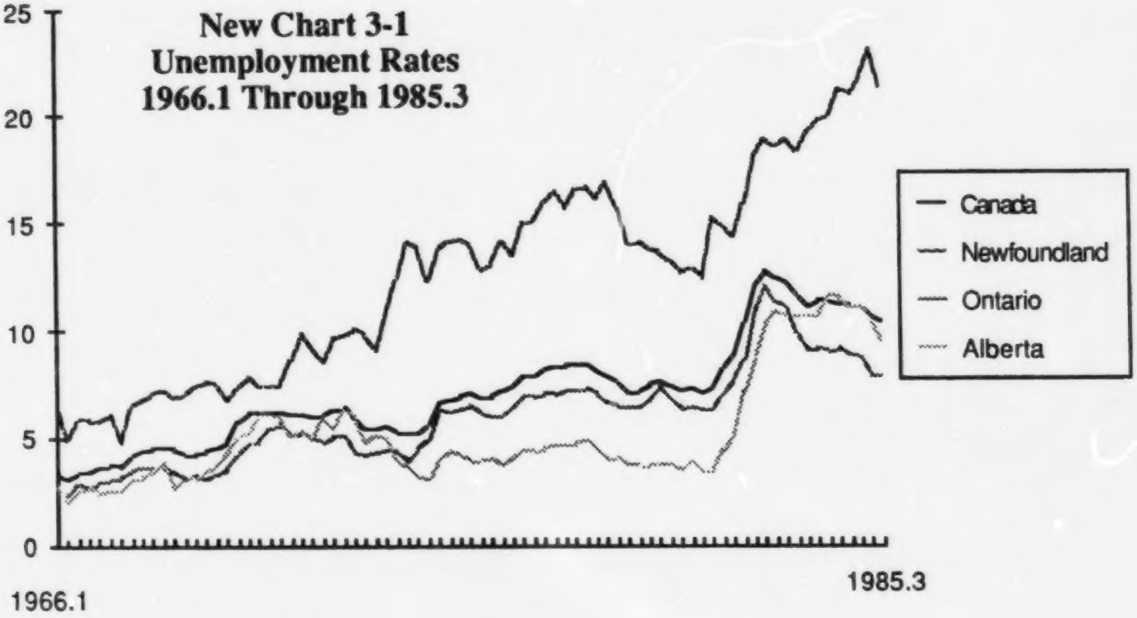
ECC Chart 3-3A

## Labour Force Participation Rates,
by Selected Age Group and Sex,
Canada and Newfoundland, 1970-84

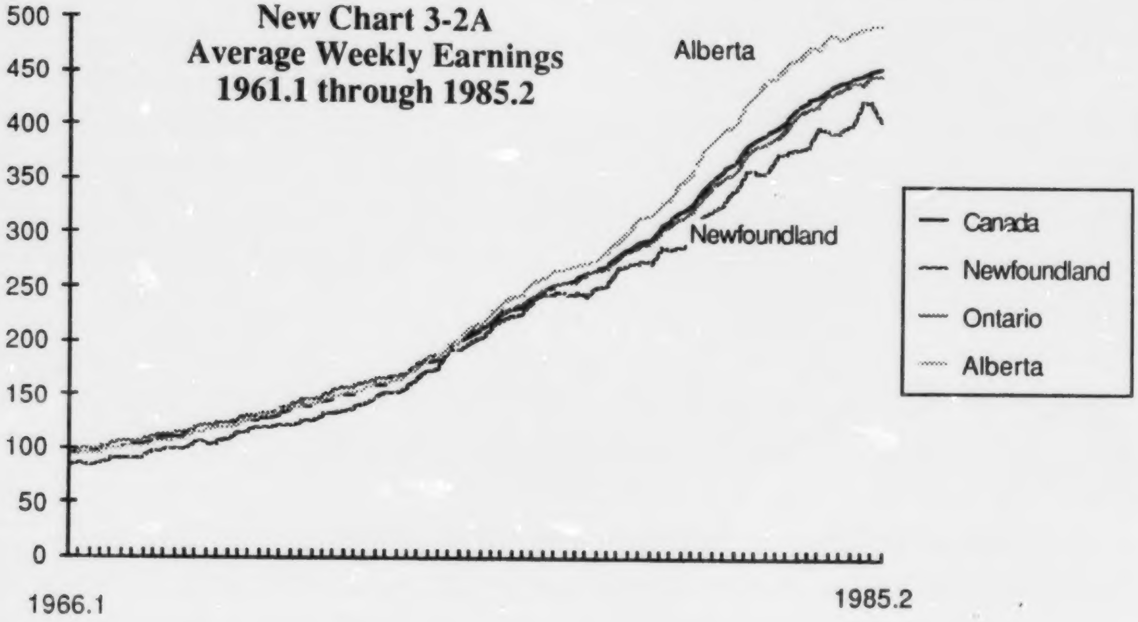


## Labour Force Participation Rates,
by Selected Age Group and Sex,
Canada and Newfoundland, 1970-84



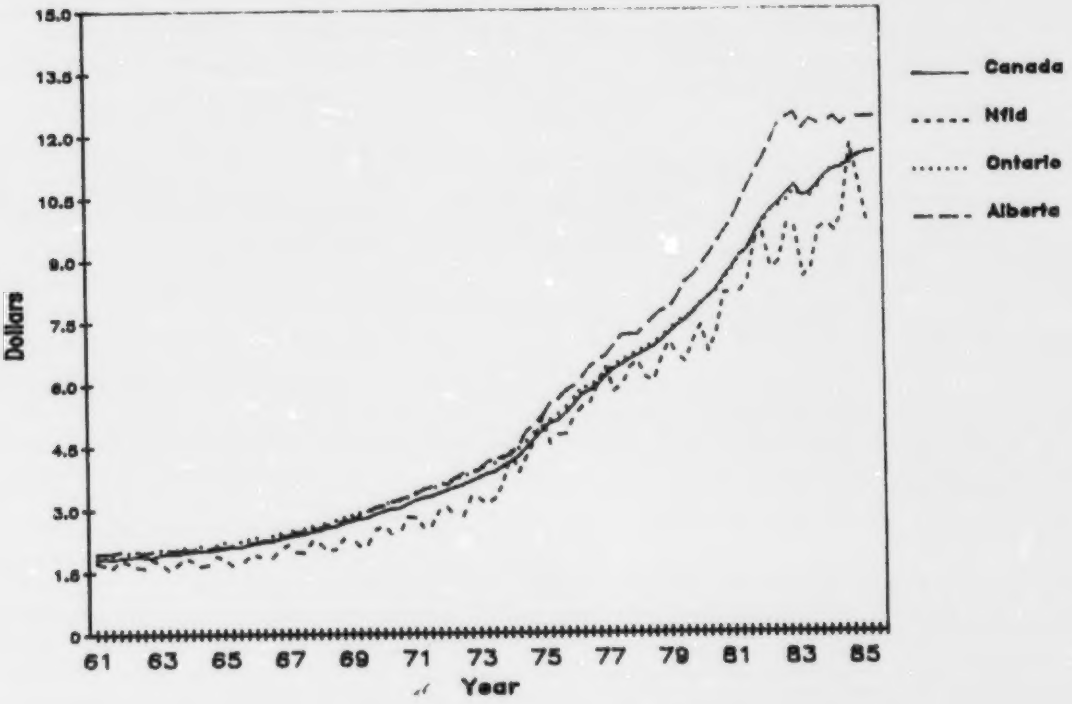


New Chart 3-1
Unemployment Rates
1966.1 Through 1985.3



New Chart 3-2A
Average Weekly Earnings
1961.1 through 1985.2

New Chart 3–2B
Average Hourly Earnings in Manufacturing
Canada and Selected Provinces
1961.1 – 1985.3



understandable that the per capita income performance of the Newfoundland economy may be much better than its unemployment performance. Much of the market income is generated locally; much of the province's unemployment and some of its income transfers are generated abroad. When the unemployed workers come home during a recession, they add to the unemployment roles, but their unemployment insurance benefits add to local disposable income.

Transfers made up 30% or personal income in Newfoundland in 1983 as opposed to 29% in 1978. The transfer share of personal income rose from 13.3% to 14.8% in the rest of Canada in the same period--primarily as a result of the world-wide recession in 1982-83. It seems that Newfoundland's exploitation of transfers had already reached such a high level that entering a recession could not call forth much by way of increases in transfers. In the rest of Canada, however, where people historically make much less use of Unemployment Insurance Benefits and other transfers, there was greater elasticity to the transfer system: a one percentage point increase in the unemployment rate in the rest of Canada apparently results in a much larger increase in income transfers than it does in Newfoundland.

These data suggest that Newfoundland is still in a dependency trap; there is nothing in the past five years' income data to suggest a reduction in the extra-ordinary importance of transfers in maintaining the personal income of Newfoundland.

## Survey of Consumer Finances Data

Similar information can be obtained from a rich new databank from Statistics Canada's new Survey of Consumer Finances which surveys all individuals in Canada age 15 and over. We have not had time to probe this data base carefully, but some of the statistics it contains are shown in the new table shown below. The data base would allow a lot of econometric hypothesis testing about relationships among personal characteristics of individuals. There is, however, no data here which sheds any light on migration.

In this particular year,1981, the Alberta economy was "riding high" before the recession of 1982. Individual Albertans had 68% higher weighted average wage income, 36 % higher average earnings among earners, 53 % more total income on which they paid 77% more income tax than Newfoundlanders. (Only P.E.I. had a lower wage and total incomes than Newfoundland.) At the same time, thanks to their high income tax rates, Newfoundlanders paid more income tax, on average, than any Atlantic province. In comparing Newfoundland/Canada wage *income* and wage *rate* disparities, notice that the average annual wage *income* reported by consumers in this survey is much lower in Newfoundland than the wage *rates* that are reported in the surveys of average weekly earnings and average hourly earnings in manufacturing in New Chart 3-2. Whereas Newfoundlanders make at or above the national average weekly and hourly wage *rates* in certain industries surveyed, they have below-average wage *income* on an annual basis. This anomaly occurs largely because Newfoundlanders work fewer weeks per year; many Newfoundland workers work only a few weeks per year since economic activity is organized on a much more seasonal basis there than in the rest of Canada (see Chapter 4).

## New Table 3-1
## Weighted Averages of Individual Income Disparities
## Consumer Survey Information 1981

| | Canada | Nfld | N.S. | Que | Ont | Man | Alta | B.C. |
|---|---|---|---|---|---|---|---|---|
| Average Wage Income | 9,404 | 6,967 | 6,957 | 8,568 | 9,930 | 8,455 | 11,680 | 10,782 |
| Total Income | 12,441 | 9,597 | 9,648 | 11,251 | 13,011 | 11,709 | 14,731 | 14,054 |
| Income Tax Paid | 1,889 | 1,332 | 1,238 | 1,784 | 1,943 | 1,631 | 2,359 | 2,199 |
| Unemployment Insurance Benefits | 211 | 595 | 328 | 303 | 149 | 135 | 90 | 170 |
| Government Transfers | 1,131 | 1,561 | 1,418 | 1,271 | 1,042 | 1,146 | 800 | 1,049 |
| Government Transfers less UI Benefits | 920 | 966 | 1,090 | 968 | 893 | 1,011 | 710 | 879 |
| Indexes, Canada = 100 | | | | | | | | |
| Earner's Average Earnings | 1.00 | .83 | .80 | .98 | 1.01 | .88 | 1.13 | 1.11 |
| Total Income, all persons | 1.00 | .77 | .78 | .90 | 1.05 | .94 | 1.18 | 1.13 |

Source: Statistics Canada, (1982) Survey of Consumer Finances microdata tape "Individuals with and without income 1981" Calculations by André Bourdon, Economic Council of Canada Data Tapes. The author also thanks Eden Cloutier who obtained the original tape.

WARNING: Under terms of the Economic Council Contract with Statistics Canada, the user is required to "consult with Statistics Canada in order that Statistics Canada may review" any forthcoming publications based on the data from these tapes.

At $595 per person over the age of 15, weighted average unemployment insurance benefits in Newfoundland were 6.6 times as large as in Alberta, largely because Newfoundland employment is so seasonal. (The unweighted survey of all individuals over the age of 15 put the UI disparity at $699 for Newfoundland versus $82 for Alberta--the highest and lowest provincial averages in Canada in 1981.) In spite of the importance of Unemployment Insurance Benefits for some families in Newfoundland--especially in rural areas--Unemployment Insurance Benefits made up only 6.2% of weighted average total income reported. UI benefits do, however, make up 38% of the government transfers to persons in Newfoundland. Newfoundland government transfers per individual are 38% above the Canadian average--primarily because of Unemployment Insurance Benefits. If we subtract Unemployment Insurance Benefits, Newfoundland government transfers to individuals are only 5% above the Canadian average--somewhat less than provinces like Nova Scotia, Quebec and Manitoba are receiving. Unemployment Insurance remains a program that is peculiarly important to personal incomes in Newfoundland.

While individual Newfoundlanders have only 77% of Canadian average total income, Newfoundlanders who are "earners" have earnings that are 83% of the Canadian average. Because Newfoundlanders are laid off seasonally, their earnings are reduced by layoffs.

## Social Statistics

Life expectancy (ECC Table 3-4) has improved in both Canada and Newfoundland in the five years since our first report. Newfoundland men continue to live just a little longer than the Canadian average, Newfoundland women just a little less.

As already noted, the live birth rates in Newfoundland have fallen sharply to near the Canadian average. Divorce and suicide rates have increased in both Canada and Newfoundland, but both are still less than half as frequent in Newfoundland. The Newfoundland abortion rate has actually declined while it has risen in the rest of Canada. Newfoundlanders have now essentially achieved the Canadian average birth rate while have less than one quarter as many abortions. Perhaps the time has come for the rest of the country to receive a little family counselling from Newfoundlanders.

Per capita education expenditures in Newfoundland now exceed the Canadian average, and the disparity between the relative percentages of 18-24 year olds taking post-secondary education has narrowed. The percentages of Newfoundland homes with running water, baths or showers, and flush toilets has risen much closer to that national average. The picture seems to indicate that access to education and amenities is continuing to improve in Newfoundland, and that life styles are apparently subject to less social disruption than in the rest of Canada.

### ECC Table 3-4
### Social Measures, Canada and Newfoundland, Selected Years

| | | Recent Data | | Original Data[1] (About Five Years Earlier) | |
|---|---|---|---|---|---|
| | | Canada | Nfld | Canada | Nfld |
| **Demography and Health** | | | | | |
| **Average Life Expectancy, 1980-82** | | | | | |
| **At birth:** | **Men** | 71.88 | 71.95 | 70.2 | 70.6 |
| | **Women** | 78.98 | 78.65 | 77.5 | 77.4 |
| **At age 20** | **Men** | 53.39 | 53.56 | 52.1 | 52.4 |
| | **Women** | 60.08 | 59.70 | 59.0 | 58.9 |
| | | | (per 1,000 population) | | |
| **Live birthrate, 1983** | | 15.0 | 15.4 | 15.6 | 19.7 |
| **Marriages, 1983** | | 7.4 | 6.6 | 8.6 | 6.9 |
| **Divorces, 1983** | | 2.8 | 1.2 | 2.4 | 0.8 |
| **Suicides, 1983** | | 0.15 | 0.06 | 0.14 | 0.04 |
| **Deaths due to malignant neoplasms, 1983** | | 1.7 | 1.4 | 1.6 | 1.1 |
| **Reported cases of tuberculosis, 1983** | | 0.09 | 0.11 | 0.14 | 0.16 |
| **Hospital bed capacity, (all hospitals), 1982** | | 7.0 | 6.5 | 8.7 | 6.8 |
| | | | (Ratio to Population) | | |
| **Physicians, 1978** | | 1:557 | 1:694 | 1:562 | 1:702 |
| **Dentists, 1978** | | 1:2254 | 1:4841 | 1:2361 | 1:4739 |

## ECC Table 3-4 Continued

| | Recent Data | | Original Data[1] (About Five Years Earlier) | |
|---|---|---|---|---|
| | Canada | Nfld | Canada | Nfld |
| | | (per 1,000 live births) | | |
| Therapeutic abortions, 1982 | 177.5 | 42.4 | 159.7 | 44.4 |
| Infant mortality rate, 1983 | 8.5 | 10.6 | 14.3 | 15.7 |
| **Education** | | | | |
| Students per teaching staff, 1983-84 (estimated) (elementary, full-time & secondary) | 18.3 | 18.0 | 20.0 | 20.4 |
| Proportion of 16-year olds in school 1982 (%) | 88.7[2] | 81.1[2] | 83.8 | 79.3 |
| Proportion of 18-24 year olds in post-secondary institutions 1983 (%) | 17.6[3] | 13.5[3] | 19.6 | 11.3 |
| | | (Dollars per capita) | | |
| Expenditures on Education per capita 1983-84 | 1226.86 | 1253.82 | 741.76 | 609.83 |
| **Transportation and Communication** | | | | |
| Number of daily newspapers, 1982 | 120 | 3 | 120 | 3 |
| Circulation (% of population), 1982 | 22.6 | n.a. | 22.3 | 8.9 |
| Number of telephones per 1,000 population 1983 | 665 | 477 | 646 | 408 |
| Number of households with autos (%) | 79.1 | 74.2 | .. | .. |
| Paved roads (km) 1982 | | | (data on different base) | |
| km per motor vehicle registration, 1982 | .027 | .047 | .. | .. |
| km per capita, 1982 | .016 | .016 | .. | .. |
| **Housing** | | | | |
| Percentage of dwellings owned | 62.4 | 82.1 | 61.8 | 80.9 |
| Houses with running water | 99.5 | 98.0 | 99.0 | 93.8 |
| bath or shower | 98.8 | 95.4 | 97.6 | 86.9 |
| flush toilet | 99.0 | 96.7 | 98.1 | 89.2 |
| | | (per 100,000 of population) | | |
| **Crime Rates** | | | | |
| Murders, 1983 | 2.5 | 7.8 | 2.8 | 1.6 |
| Robberies, 1983 | 97.5 | 13.0 | 84.6 | 9.4 |

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Source: Computations made by Economic Council Statistical Staff

1. See Table 3-4 in *Newfoundland: From Dependency to Self-Reliance*
2. 1981 for Newfoundland. Canada's proportion in 1981 was 87.4.
3. 1981 for Newfoundland. Canada's proportion in 1981 was 20.5.

## The Role of Government

The provincial accounts reveal a shocking difference in the makeup of aggregate demand in Canada by province (New Table 3-2). Newfoundland runs a huge balance of payments deficit with the rest of the country which is financed by massive transfers from the rest of Canada to the government of Newfoundland and to individuals living in Newfoundland. That is how the province is able to have a level of consumption that amounts to more than 80% of the value of local economic activity. While we do not have recent data, 1980 was a better year for Newfoundland than 1975--in the sense that its balance of payments deficit with the rest of Canada was smaller, and its own economic activity was able to provide a larger share of its own aggregate demand.

If Newfoundland were a separate country, we would say its currency is overvalued--that its cost structure seems to be too high to make it competitive with its trading partners. There are two ways to overcome a balance of payments deficit--reduce aggregate demand so as to reduce imports and to release factors of production to the export sector, or to lower the price level relative to trading partners. In the face of massive unemployment, it is the reduction in the exchange rate that is needed to make Newfoundland's exports more attractive and to make the import competing industry more competitive against imports--not a reduction in aggregate demand. If it had its own currency, Newfoundland should be letting its money supply expand a little and letting interest rates fall so as to encourage the local demand for investment to rise and to discourage the large inflow of foreign funds that is keeping the exchange rate overvalued.

Since Newfoundland is not a separate country, it does not have the option of lowering its interest rates and exchange rates. But, then, its big "foreign" inflow of funds is not being attracted by its interest rates either; the "foreign" inflow is a massive bundle of subsidies and transfers that is being pushed into Newfoundland by the political apparatus. The "foreign" inflow of funds is not seeking higher rates of interest at all.

How could we make the situation worse? Probably by increasing the inflow of transfers and increasing Newfoundland's costs by raising Newfoundland wage rates and prices, and by reducing the productivity of its industries so as to make them still more costly.

In some sense, that is what the political system does. To combat unemployment, governments dream up ways to "create jobs". Sometimes the jobs are created by doing things in an inefficient way--like off-loading all the freight at the farthest southwest corner of the province and hauling it circuitously all the way across the island to tidewater on the northeast corner--where it would have been more easily reached by ocean-going vessel in the first place. This process of double transshipment makes work alright. And it increases costs, thereby discouraging the development of home goods industries.

In spite of Newfoundland's weak local economy, investment still makes up a larger share of its total economic activity than is true for Ontario Canada as a whole. Admittedly, a disproportionately large share of the investment is accounted for by government, but government's share has been reduced and the percentage accounted for by the private sector still exceeds that of Canada or Ontario.

## New Table 3-2
## The Composition of Aggregate Demand: Shares of Gross Provincial Expenditure, 1975, 1980

| | Canada | | Newfoundland | | Ontario | | Alberta | |
|---|---|---|---|---|---|---|---|---|
| | 1975 | 1980 | 1975 | 1980<br>(Percent) | 1975 | 1980 | 1975 | 1980 |
| Consumption | 57.4 | 56.2 | 85.1 | 81.8 | 56.8 | 56.1 | 41.9 | 43.3 |
| Government | 19.6 | 19.3 | 22.9 | 25.9 | 18.0 | 18.5 | 13.4 | 12.7 |
| Investment | 23.8 | 23.0 | 34.2 | 28.7 | 20.8 | 17.9 | 27.7 | 37.4 |
| of which, Government | 3.8 | 2.7 | 10.4 | 4.7 | 3.0 | 1.8 | 3.6 | 3.5 |
| Business | 20.0 | 20.3 | 23.7 | 24.0 | 17.9 | 16.0 | 24.0 | 33.9 |
| Net Exports and Residual Error | -.06 | 1.9 | -43.2 | -36.5 | 3.8 | 7.9 | 16.1 | 6.4 |

Source: Statistics Canada Catalogue No. 13-213 *Provincial Economic Accounts: Experimental Data*, 1965-1980, Table 2.

## Provincial Revenues

ECC Table 3-5 updated shows that there has been very little change in the percentage distribution of provincial government revenues since the Economic Council published its 1980 report.

## Federal Spending

ECC Table 3-6 updated shows that between 1978 and 1983 transfers rose faster in Canada as a whole than in Newfoundland, but the proportion of personal income made up of transfers remained about the same.

## Provincial Government Debt

ECC Table 3-12 updated shows that Newfoundland made progress in reducing its debt to 73.1 % of personal income from 81.2 %, but its debt position is still the highest in Canada. Although the outstanding debt has declined relative to personal income, the debt charges have risen from 5.0 % in 1977-78 to peak at 6.4% in 1979-80 as a result of the increase in interest rates (ECC Table 3-13). Newfoundland debt charges amount to more than double the percentage of personal income of the larger provinces like Quebec, Ontario Alberta and British Columbia. A region with an overvalued exchange rate and a high interest rate policy ends up discouraging local taxable activity and borrowing the money to get outsiders to provide the food, shelter and clothing.

ECC Table 3-14 suggests that the composition of Newfoundland's debt has changed somewhat between 1978 and 1983. Non-market issues make up a larger share, partly because the Canada Pension Plan has picked up a larger amount of Newfoundland debt and because the Alberta Heritage Fund has picked up another large chunk. One more dubious change is the shift out of the Canadian and U.S. bond markets into the

ECC Table 3-5
Distribution of Provincial
Gross General Revenue
by Major Source and Province
Canada, 1982-83 (1)

| | Newfound-land 1977-78 | Newfound-land 1982-83 | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatche-wan | Alberta | British Columbia | Canada |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (Millions | of | dollars) | | | | |
| Gross general revenue | 1057 | 1186.3 | 404.7 | 2470.8 | 2038 | 24473.3 | 21669.8 | 2859.8 | 3203.3 | 13225.5 | 8508.6 | 79745.3 |
| | | | | | | | (Per cent) | | | | | |
| Provincial government revenue (own source) | 52.9 | 52.8 | 49.9 | 57.4 | 55.4 | 79.4 | 85 | 68.1 | 84.8 | 93.5 | 86.1 | 81.7 |
| Personal income tax | 12.2 | 12.8 | 10.8 | 17.2 | 15.2 | 29.7 | 27.4 | 20.3 | 19.5 | 11.8 | 22.6 | 23.3 |
| Corporate income tax | 2.3 | 2.8 | 2 | 4.2 | 4.3 | 2.7 | 4.6 | 5.1 | 3.6 | 5.1 | 5.9 | 4.2 |
| General sales tax | 14.9 | 15.2 | 10.3 | 13.2 | 12 | 8.9 | 17.1 | 10.2 | 10.4 | 0 | 14.7 | 10.8 |
| Motor fuel taxes | 3.8 | 3.2 | 3.8 | 4.2 | 4 | 5.6 | 5.3 | 4.2 | 0.5 | 0.1 | 5.6 | 4.2 |
| Health insurance premiums | 0 | 0 | 0 | 0 | 0 | 6 | 6.3 | 2.4 | 0 | 1.3 | 2.9 | 4.1 |
| Workmens compensation contributions | 1.2 | 0.9 | 1.1 | 1.3 | 1.5 | 2.8 | 3.2 | 1.3 | 1.8 | 1.5 | 4.2 | 2.6 |
| Other provincial taxes | 2.3 | 2.8 | 6.7 | 1.7 | 5.8 | 9.2 | 5.2 | 4.3 | 3.9 | 0.8 | 3.9 | 5.3 |
| Natural resource revenue | 1.7 | 1.6 | 0.2 | 0.6 | 0.9 | 0.6 | 0.7 | 2 | 25.9 | 51.6 | 7.5 | 10.9 |
| Privileges, licences and permits | 2.5 | 2.6 | 0.9 | 1.6 | 1.7 | 3.3 | 2.8 | 1.4 | 1.5 | 0.9 | 2.4 | 2.4 |
| Liquor board profits | 1.9 | 1.9 | 2.1 | 3.9 | 2.9 | 1.2 | 2.4 | 3.9 | 2.9 | 1.4 | 3.8 | 2.1 |
| Non-tax revenue from own sources | 10.1 | 9.1 | 12 | 9.5 | 7.2 | 9.5 | 10.3 | 12.9 | 14.8 | 19.1 | 12.5 | 11.9 |
| Transfers from other levels of government | 47.1 | 47.2 | 50.1 | 42.6 | 44.6 | 20.6 | 15 | 31.9 | 15.2 | 6.5 | 13.9 | 18.3 |
| General purpose transfers | 27.6 | 30.6 | 31.7 | 25.5 | 26.2 | 11.9 | 0.3 | 16 | -0.8 | 1 | 0.1 | 6.6 |
| Specific purpose transfers | 19.5 | 16.6 | 18.4 | 17.1 | 18.3 | 8.7 | 14.7 | 15.9 | 16 | 5.5 | 13.8 | 11.6 |
| Total gross general revenue | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | | | | | | | (Dollars) | | | | | |
| Provincial government revenue (own source) per capita | 973.31 | 1751.77 | 1644.34 | 1663.31 | 1616.49 | 2877.83 | 2112..80 | 1882.47 | 2778.16 | 5332.57 | 2624.9 | 2653.19 |
| Total gross general revenue per capita | 1841.4 | 3318.11 | 3298.17 | 2901 | 2916.07 | 3622.54 | 2486.19 | 2764.45 | 3276.8 | 5704.33 | 3048.49 | 3246.84 |
| Proportion of personal income: | | | | | | | (Per cent) | | | | | |
| Provincial government revenue (own source) | 19.7 | 20.3 | 18.3 | 16.4 | 17.4 | 24 | 15.2 | 15.6 | 22.3 | 37.5 | 19 | 20.6 |
| Total gross general revenue | 37.3 | 38.5 | 36.8 | 28.6 | 31.4 | 30.2 | 17.9 | 22.9 | 26.3 | 40.1 | 22 | 25.2 |
| Ratio of provincial to Canadian gross general revenue per capita | 1.002 | 1.022 | 1.016 | 0.893 | 0.898 | 1.116 | 0.766 | 0.851 | 1.009 | 1.757 | 0.939 | 1 |

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Source: Statistics Canada, computations by ECC
(1) Preliminary

ECC Table 3-6
Federal Transfer Payments to Persons
Newfoundland, 1963-1983

| | 1963 | 1968 | 1973 | 1978 | 1983 |
|---|---|---|---|---|---|
| | | (Millions | of current | dollars) | |
| Family allowances | 17 | 19 | 21 | 67 | 68 |
| Unemployment insurance benefits | 20 | 21 | 91 | 250 | 458 |
| Old age security fund payments | 15 | 31 | 60 | 118 | 238 |
| Adult occupational training payments | 0 | 3 | 7 | 6 | 4 |
| Local initiatives program | 0 | 0 | 11 | 0 | 0 |
| Other | 6 | 11 | 27 | 74 | 100 |
| Total | 58 | 85 | 217 | 515 | 868 |
| | | | (Per cent) | | |
| Transfer payments as a proportion of personal income: | | | | | |
| Newfoundland | 11.8 | 10.2 | 14.2 | 16.8 | 16.4 |
| Canada | 6.1 | 5.9 | 7.2 | 7.7 | 8.4 |
| | | | (Current $) | | |
| Federal transfers to persons per capita: | | | | | |
| In current dollars | | | | | |
| Newfoundland | 121.85 | 167.98 | 403.95 | 917.19 | 1506.42 |
| Canada | 112.73 | 159.17 | 317.93 | 622.42 | 1132.28 |
| | | | (1981 $) | | |
| In 1981 dollars | | | | | |
| Newfoundland | 373.77 | 442.65 | 848.63 | 1241.12 | 1285.34 |
| Canada | 345.8 | 418.87 | 667.9 | 842.8 | 966.11 |
| | | | (Ratio) | | |
| Ratio of Newfoundland to Canada (based on 1981 dollars) | 1.081 | 1.055 | 1.271 | 1.475 | 1.33 |

Source: Statistics Canada Provincial Economic Accounts, March 1985

ECC Table 3-12
Provincial Direct and Indirect Liabilities
Selected Years Ending March 31, 1951-82

| | 1951 | 1956 | 1961 | 1966 | 1971 | 1976 | 1978 | 1980 | 1982 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | (Dollars) | | | | |
| Debt per capita | | | | | | | | | |
| Newfoundland | 28 | 200 | 267 | 667 | 1,708 | 3,496 | 4,045 | 4,801 | 5,669 |
| Prince Edward Island | 163 | 212 | 347 | 743 | 1,135 | 1,540 | 1,649 | 2,107 | 2,692 |
| Nova Scotia | 259 | 290 | 381 | 506 | 1,230 | 2,163 | 2,653 | 3,388 | 4,472 |
| New Brunswick | 320 | 349 | 441 | 657 | 1,259 | 2,312 | 3,261 | 4,714 | 5,559 |
| Quebec | 167 | 176 | 248 | 651 | 1,030 | 2,225 | 3,098 | 4,206 | 5,808 |
| Ontario | 256 | 373 | 526 | 611 | 1,033 | 2,144 | 2,623 | 3,210 | 3,832 |
| Manitoba | 152 | 225 | 530 | 805 | 1,419 | 3,089 | 4,086 | 4,430 | 5,205 |
| Saskatchewan | 196 | 263 | 486 | 625 | 881 | 1,158 | 1,879 | 2,449 | 3,687 |
| Alberta | 128 | 86 | 266 | 377 | 962 | 2,016 | 3,084 | 4,103 | 5,936 |
| British Columbia | 217 | 231 | 400 | 797 | 1,173 | 2,029 | 2,748 | 3,386 | 4,466 |
| All provinces | 205 | 260 | 390 | 632 | 1,083 | 2,184 | 2,886 | 3,678 | 4,766 |
| Debt as a proportion of personal income | | | | | (Per cent) | | | | |
| Newfoundland | 5.5 | 28.4 | 29.6 | 54.5 | 87 | 86.3 | 81.2 | 79.3 | 73.1 |
| Prince Edward Island | 29 | 31.5 | 37.5 | 58.9 | 55.3 | 36.9 | 33.8 | 33.8 | 33.8 |
| Nova Scotia | 33.6 | 29.5 | 30.5 | 32.4 | 51.2 | 46 | 45.5 | 46.7 | 49.1 |
| New Brunswick | 43.9 | 39.6 | 39.7 | 46 | 56.6 | 50.8 | 60 | 69.5 | 66.1 |
| Quebec | 19.1 | 15.4 | 17.6 | 35.2 | 37.2 | 41 | 45.2 | 50 | 52.7 |
| Ontario | 20.9 | 23.6 | 27.5 | 25.7 | 28.4 | 32.9 | 33 | 33 | 30.5 |
| Manitoba | 14.5 | 17.8 | 32.7 | 41 | 49.1 | 53.8 | 60.1 | 53.7 | 47.8 |
| Saskatchewan | 22.5 | 21.9 | 33.3 | 33.4 | 38.3 | 18.9 | 27.8 | 29.6 | 31.8 |
| Alberta | 12.6 | 6.5 | 10.4 | 18.7 | 31.6 | 33.7 | 41.4 | 43.9 | 46.8 |
| British Columbia | 17.1 | 14.4 | 21.3 | 34.9 | 35.4 | 31.7 | 34.3 | 34.8 | 35.2 |
| All provinces | 20.1 | 19.7 | 24.1 | 30.9 | 35.1 | 36.8 | 39.6 | 41.1 | 40.9 |

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Note: Liabilities are less sinking funds
In the 1950-51 fiscal year, some provinces had different year-end dates.

**ECC Table 3-13**
**Gross Provincial Debt Charges as a Proportion of Personal Income Selected Fiscal Years, 1955 to 1982**

|  | Newfoundland | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia | All Provinces |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  | (Per cent) |  |  |  |  |  |
| 1955-56 | 0.6 | 1.2 | 1.2 | 1.6 | 0.3 | 0.5 | 0.6 | 0.7 | 0.2 | 0.4 | 0.5 |
| 1960-61 | 1 | 1.5 | 1.4 | 1.6 | 0.3 | 0.6 | 1 | 1.2 | 0 | 0.1 | 0.5 |
| 1965-66 | 1.9 | 2.2 | 1.6 | 1.7 | 0.7 | 0.7 | 1 | 1.7 | 0 | 0 | 0.7 |
| 1970-71 | 2.5 | 3.3 | 3.1 | 1.1 | 1.2 | 1.1 | 1.7 | 2 | 1.3 | 0.4 | 1.2 |
| 1975-76 | 4.6 | 2.6 | 2.4 | 1.3 | 1.4 | 1.6 | 1.1 | 1.1 | 1.2 | 0.4 | 1.4 |
| 1977-78 | 5 | 2.5 | 2.2 | 2.2 | 1.6 | 1.8 | 2.2 | 2.1 | 1.2 | 0.6 | 1.6 |
| 1979-80 | 6.4 | 2.9 | 2.4 | 2.5 | 1.9 | 1.9 | 3.2 | 2.6 | 1.3 | 0.6 | 1.9 |
| 1981-82 | 5.9 | 3.9 | 3.3 | 3 | 2.6 | 1.8 | 3.2 | 2.9 | 1.2 | 0.4 | 2 |

Note: Excludes retirements

ECC Table 3-14
Distribution of Market and Non-Market Bond Issues,
by Provincial Governments,
Outstanding as of March 31, 198. (1)

| | Newfound-land 1978 | Newfound-land 1983 | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatche-wan | Alberta | British Columbia | All Provinces |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | (Per cent) | | | | | |
| Market Issues | | | | | | | | | | | | |
| Canada | 32 | 22.7 | 46.1 | 21.6 | 16.5 | 25.1 | 4 | 10.3 | 38 | 15.4 | 6.3 | 14.5 |
| United States | 31 | 28.8 | 0.4 | 21.7 | 29 | 5.6 | 19.6 | 17.2 | 15.1 | 1.2 | 4.5 | 14.4 |
| Europe | 7.2 | 1.3 | 0 | 2.5 | 0 | 5.2 | 0.1 | 14.4 | 3 | 0 | 0 | 2.4 |
| Other | 0 | 0 | 0 | 0 | 2.3 | 3.4 | 0 | 4.7 | 0 | 0 | 0 | 1.1 |
| International | 12.1 | 20.4 | 0 | 14.1 | 8.2 | 9.3 | 0 | 10.7 | 17 | 0 | 0 | 5.5 |
| Total market issues | 82.3 | 73.2 | 46.5 | 60 | 56 | 48.6 | 23.7 | 57.3 | 73.1 | 16.6 | 10.8 | 37.9 |
| Non-market issues: | | | | | | | | | | | | |
| Provincial governments | 3 | 8.9 | 25.9 | 9.7 | 11.7 | 0 | 0 | 7.3 | 0.2 | 42.1 | 11.4 | 6.3 |
| Own government enterprises | 0 | 0 | 0 | 0 | 0 | 38.5 | 0 | 1.5 | 1.8 | 0 | 0 | 8.4 |
| Provincial pension plan | 0 | 0 | 0 | 1.7 | 0 | 0 | 27.5 | 0.1 | 0 | 0 | 7.5 | 11.2 |
| Canada Pension Plan | 14.7 | 17.9 | 27.6 | 28.6 | 32.3 | 0.7 | 48.8 | 33.6 | 24.9 | 41.3 | 70.3 | 33.6 |
| Other (savings bonds) | 0 | 0 | 0 | 0 | 0 | 12.2 | 0 | 0.1 | 0 | 0 | 0 | 2.6 |
| Total non-market issues | 17.7 | 26.8 | 53.5 | 40 | 44 | 51.4 | 76.3 | 42.7 | 26.9 | 83.4 | 89.2 | 62.1 |
| | | | | | | | (Thousands of current dollars) | | | | | |
| Total market and non-market bond issues (2) | 1687.9 | 2635.8 | 355 | 3152 | 2107.5 | 13662.3 | 25191.7 | 3885.2 | 4129 | 5904.7 | 3235 | 64258.3 |

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(1) Preliminary
(2) Using exchange rates at time of issue
Note: Figures may not add due to rounding.
Source: Statistics Canada, Provincial Govt. Finance, Cat. # 68-298, 1982-83 Preliminary.

international market. Certainly Newfoundland is subject to much more foreign exchange risk on its debt than other provinces are. About half of Newfoundland's debt continues to be in foreign currencies.

What is the nature of assets the provincial government has acquired with the money it has borrowed in foreign and domestic markets? ECC Table 3-15 shows the change in the major components of Provincial Loans, Advances and Mortgages Receivable between 1978 and 1984. (These figures do not include all the province's share of the new crown corporation, Fishery Products International--the latest major bailout that has been organized.)

The Council previously drew attention to the $239.6 million writeoff on the Labrador Linerboard Mill--40% of the province's gross financial assets--$527 for every man, woman and child in the province--the per capita equivalent lost for Canada as a whole would amount to about $12.4 billion. The Council also noted the net loss the province was to sustain because of its outstanding guaranteed indebtedness of the Javelin Paper Corporation and Newfoundland and Labrador Corporation, also associated with Labrador Linerboard. It pointed out that the Gull Island Power loan, which the province had made, would have to be foregiven if the project was not reactivated by 1980 (it wasn't). The Council pointed out the uncertainty of the provincial mortgage on the Come-By-Chance Refinery (which is still mothballed) and $14.7 million in credits to Hotel Buildings Limited.

Given Newfoundland's past history with big investments, the obvious question is this: what will be the status of the province's balance after the next two major projects have had their impact on ECC Table 3-14, namely Fishery Products International and Hibernia? Financing for Hibernia has not yet been negotiated. The world oil market is in some disarray. Our cash flow analysis suggests that Hibernia will have to operate at an economic loss, given current world oil prices and the latest official cost estimates. Negotiators will have to negotiate a rather more flexible and resilient fiscal regime and financial shock absorber for Hibernia than they have been able to do for Labrador Linerboard, Come-By-Chance and Fishery Products International.

## The Promise of Hibernia

Will Hibernia go the way of Labrador Linerboard? It could. If the province picks up loan guarantees and advances the money to get the project going, if it requires Mobil Oil to hire a lot of people on terms that are not very economic, if it requires that all the materials and equipment be shipped by truck and rail when they can be floated into place in a single shipping, if labour unionizes and demands "world scale" wages up front while productivity lags, and if the world oil price sags for the next decade, then Hibernia could go the way of most Newfoundland big investments.

But it need not be that way. Hibernia presents the largest opportunity to galvanize government action in a constructive direction that the province has seen for a long time.

- The project can reinforce the island's urban structure on the Avalon Peninsula--if the government of Newfoundland can convince its electorate to accept the most economic methods of sourcing materials and delivering them.
- The project provides Newfoundlanders with the opportunity to develop a broad range of skills in a modern industry which might have a good future.
- Sometime in the next decade oil prices may recover, generating substantial revenues.

ECC Table 3-15

**Major Components of Provincial Loans, Advances and Mortgages Receivable, Newfoundland, March 31, 1978 and March 31, 1984**

| | 1978 | 1984 |
|---|---|---|
| | (Millions of Dollars) | |
| Crown financial intermediaries | 75.6 | 144.8 |
| Other Crown Corporations | 426.6 | 35.3 |
| Subtotal | 502.2 | 181.1 |
| Other commercial and private companies | 62.2 | 26.4 |
| Other | 6 | 17.1 |
| Less allowance for doubtful accounts | -239.6 | |
| Total | 330.8 | 223.6 |

On the policy side, flexible means have to be found to ensure that Hibernia goes ahead, without becoming another Labrador Linerboard. First, if the company is given a relatively free hand to locate its projects in the most economic places, it can avoid the Labrador Linerboard problem of locating economic activity in hopelesssly costly places just because pockets of unemployment were most severe there. Fortunately the Fixed Production System is judged to be the cheapest.

Of course, governments can negotiate fiscal regimes for Hibernia that forego royalty revenues for a long time until the company achieves some kind of payout (Copithorne, MacFadyen and Bell, 1985), but Hibernia may need more help than that, given the decline in the world oil price. The levelized cost of production is currently estimated bo be in the order of $36.50 Canadian per barrel (Table 8-1, Chapter 8), and the world oil price has recently been below that. Costs could go higher if governments try to tie too much job creation to the project, or if domestic suppliers and workers try to demand payments that are too high relative to the productivity of their own performance.

How can the province "devalue its currency" so as to make this project viable, if world oil prices go badly? How can the costs be reduced--if need be? Provincial government guarantees and more subsidies have all been tried before--which is what put Newfoundland into the peculiar macroeconomic bind it is in today.

One solution for facing a risky investment is to do what Newfoundlanders have always done--take a share of the catch. Historically fishermen did not work for wages; the captain, crew and the vessel owner all pooled their resources and divided the proceeds according to prearrangement. Prairie wheat farmers do something similar in pooling their efforts through the Wheat Pools and the Canadian Wheat Board, making use of a type of conservative advance payment system.

In the case of the massive offshore oil project, it would be possible to designate "Hibernia Project Jobs", to make modest interim wage payments for the work as it was completed, and to give each worker a "share of the catch"--with interest--in future as (and if) revenues turned favourably. An independent board could monitor oil industry wages around the world and Newfoundland workers could be paid some fraction of these "official" wage rates as the work was done--just as Prairie farmers take an interim payment for wheat that has yet to be sold. The federal and provincial governments could arrange a special fund by which part of the projects' economic rents could be distributed to the workers in proportion to the contribution they had individually made to the project during construction. The end result would be something akin to a de-facto devaluation of Newfoundland's currency during the construction stage, it would increase the probability of the project being viable during periods of weak international oil prices, but it would also hold out the prospect that workers who had taken "Hibernia Project Jobs" would get "world scale wages with interest" if the project turned out to be successful enough to generate positive economic rents.

# 4

# LABOUR MARKET PERFORMANCE

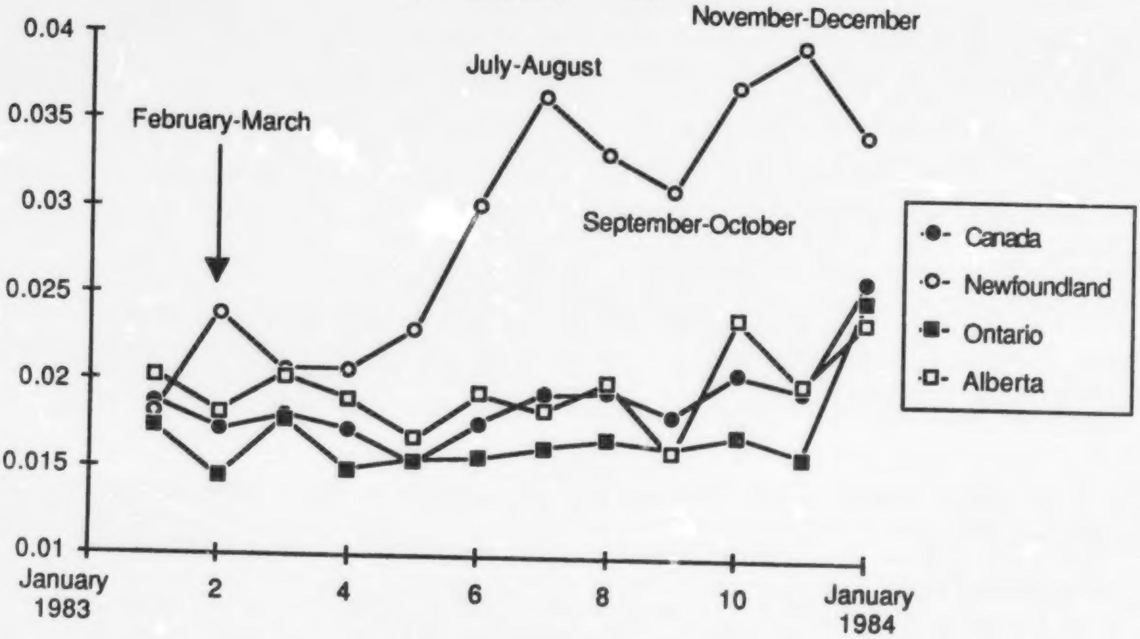
Newfoundland is a provincial labour market like no other in Canada. Its historically high unemployment rates put it in a class by itself (Chart 3-1). Its remarkable seasonality, which the Economic Council noticed in 1980, is even more starkly portrayed by longer time series data on labour market flows that are available now (Chart 4-1). In 1979-80 these data were being explored for the first time by Council researchers like Harry Postner (1980). Since then, Abrar Hasan and Patrice De Brouker (1985) have published a book on labour market flows but give little detail on Newfoundland. The current text, however, does contains new data comparing Newfoundland with Ontario, Alberta and Canada.

There appears to have been little fundamental change in the general characteristics of the Newfoundland labour market since 1980--except in wage rate statistics (Chart 3-2). In 1980 the Economic Council noted that wage rates, as measured by average weekly and hourly earnings were below the national average, but within 93 to 97 percent of the levels in Ontario. In its work attitude survey, the Council noted a greater reluctance to accept lower wages as a means of getting a job in Newfoundland than in Ontario--a difference that was statistically significant. The Council also noted that productivity, by a variety of measures, was lower in Newfoundland than in Ontario by amounts ranging from zero to 38 per cent. Gross Domestic Product per worker was about 20 per cent lower in Newfoundland. The large productivity differential in the face of the smaller wage differential made it difficult to attract and hold employment in Newfoundland. The Council did not recommend cutting Newfoundland wages; it did recommend a concerted effort to raise productivity. Since 1980, official statistics indicate that the Newfoundland average hourly earnings have come to exceed the levels in Ontario and Canada. Gross domestic product per worker in Newfoundland was about 15 per cent below Ontario during 1982 and 1983.

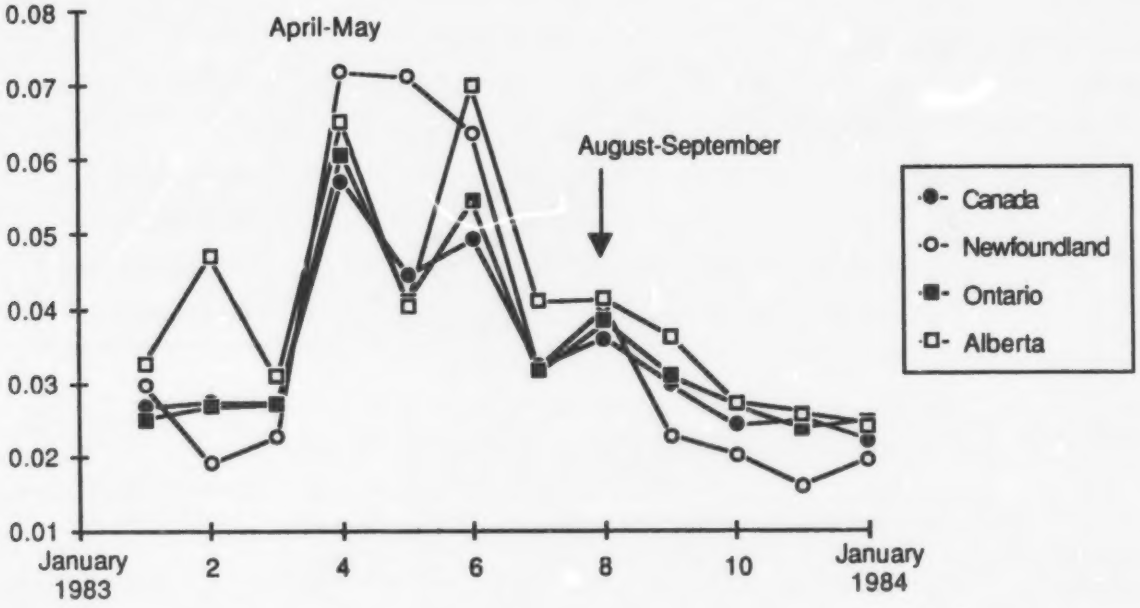
In 1980, the Economic Council was able to report the results of a special work attitude survey and special computer runs on census data which it had undertaken at considerable expense. It had also undertaken a special study of seasonality in employment and unemployment. For the current mini-project, the Council has purchased special computer runs of labour market flow data prepared by Statistics Canada which it has given to the Newfoundland Royal Commission on Employment and Unemployment. Some of these data are portrayed in Charts 4-1 through 4-4 and in Appendix E.

The current text also contains some rough statistical correlations in elasticity format which enable us to make some useful comparisons of the labour market performance of Newfoundland with Ontario and Alberta. These particular comparisons show interprovincial contrasts and illustrate what is happening at both ends of the most important migration pipelines in which thousands of Newfoundlanders participate. Employment and unemployment in Newfoundland are not static; they reflect continuous flows of people out of Newfoundland and back again; they also reflect the flow of local people into and out of employment as they share jobs in the seasonal fish plants, construction, transportation and other activities within Newfoundland. The flows reflect the continuous economic calculations that humans make as they respond to the economic pressures and incentives that are built into the Canadian economy--the mosaic of fishery policy, income maintence policies, and happenstance.

**Chart 4-1**
**Proportion of Employed Persons Leaving Labour Force by Month, 1983**

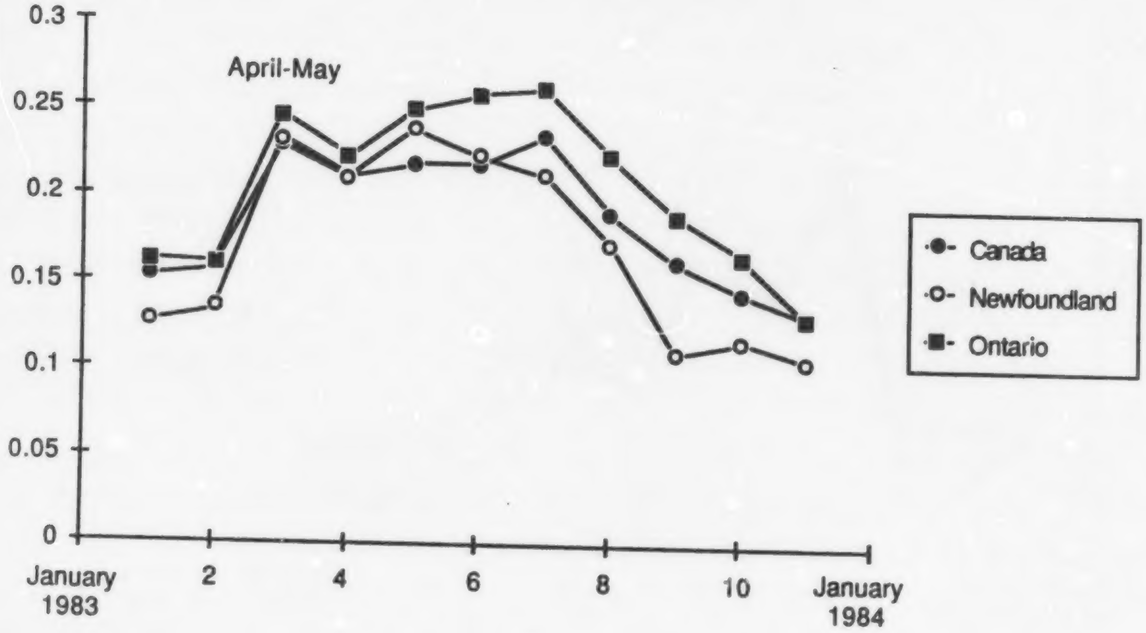


## Chart 4-2
## Proportion of Persons Not in Labour Force Moving Into Jobs by Month, 1983

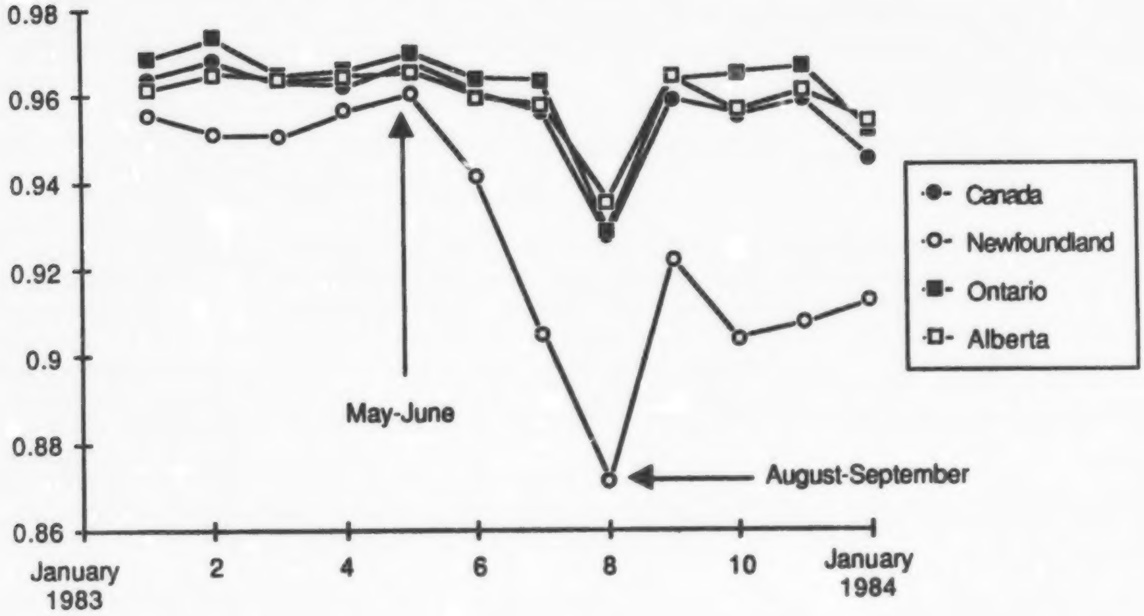


## Chart 4-3

## Proportion of Unemployed Workers Finding a Job That Month, 1983



## Chart 4-4
## Proportion of Employed Workers Who Kept Their Jobs From Month to Month, 1983



# Labour Market Flows

During the monthly Labour Force Survey by Statistics Canada, each person interviewed is classified as "employed", "unemployed", or "not in the labour force". The following month, Statistics Canada interviews five sixths of these same people again. By comparing two month's data, Statistics Canada is able to estimate the numbers and proportions of people in each province who have retained their jobs or moved from one labour force state to another. For example, one can estimate the proportions of employed persons who lost or left their jobs to become unemployed or to move out of the labour force. As is explained in detail in Postner (1980) and Hasan and de Broucker (1985), Statistics Canada can estimate nine different labour flows in all (Table 4-1). The dynamic paths of the labour market flows can also be illustrated over time (Charts 4-1 through 4-4 and Appendix E).

The proportions of persons moving from one labour force state to another can be throught of as probabilities. For example, in 1984, the probability that an unemployed worker in August would find a job by September was 0.168 in Newfoundland and 0.273 in Ontario (Table 4-1). The probability of an employed worker keeping his job in August 1984 was 0.934 in Alberta and only 0.868 in Newfoundland. There was a 0.091 probability that an employed worker in Newfoundland would leave the labour force by September, but only a 0.045 probability that an employed Alberta worker would do the same.

In Newfoundland, the most active labour market flows are in August-September as the glut season in the Cod Fishery comes to an end, and as students and teachers leave their summer work in the fishery, the fish plants and construction projects to head back to school (Chart 4-1). Many seasonal fish plants close during that time. But August-September is also a good time to look for a job--a job opening that has been created by someone who is leaving the labour force for a few months. (Charts 4-2 and 4-3). Notice the extra-ordinarily large percentage of Newfoundland workers who leave the labour force year after year from June onward (Appendix E). Many Newfoundland worker are accustomed to seasonal work and they build their lives around it. Workers in small seasonal fish plants often have trouble working the minimum 10 weeks required to qualify for Unemployment Insurance before the plant closes for the season.

In Newfoundland, a secondary peak of labour market flows occurs in late October-early November when the Fishermen's Unemployment Insurance Benefit Season begins. Seasonal inshore fishermen are eligible to collect benefits starting in the first week of November if they will tie up their boats and file their applications--which many of them do. For their part, the Cod, in response to cooler water temperatures, migrate back out to deeper and warmer water on the Grand Banks for the winter where they continue to be harvested by the deep sea trawlers. Perhaps half the Cod will leave the Grand Banks next May-June to follow the Capelin inshore again where the seasonal inshore fishermen will again be waiting with their traps and lines.

The slowest season in the labour market is in February-March, those dark months when only the hard core employed still have jobs. Even in Newfoundland, if a person still has a job in February, he is more likely to keep it than at other times during the year (Chart 4-4).

As the Economic Council's work attitude survey demonstrated in 1978, many of the Newfoundland workers who move out of the labour force still want jobs. But in rural Newfoundland, they see no point in looking for a job because they already know the local

## Table 4-1
## Peak Labour Market Flows From August 1984 to September 1984

| Labour Market Status in August 1984 / Labour Market Status in September 1984 | Employed | Unemployed | Not in Labour Force | Total[1] |
|---|---|---|---|---|
| | | (per cent ) | | |
| **Canada** | | | | |
| Employed | 92.6 | 2.2 | 5.2 | 100[1] |
| Unemployed | 23.6 | 60.2 | 16.1 | 100 |
| Not in Labour Force | 3.6 | 4.3 | 92.1 | 100 |
| **Ontario** | | | | |
| Employed | 92.7 | 2.1 | 5.3 | 100 |
| Unemployed | 27.3 | 54.8 | 17.9 | 100 |
| Not in Labour Force | 3.9 | 3.5 | 92.6 | 100 |
| **Alberta** | | | | |
| Employed | 93.4 | 2.1 | 4.5 | 100 |
| Unemployed | 23.9 | 62.8 | 13.3 | 100 |
| Not in Labour Force | 4.5 | 5.4 | 90.2 | 100 |
| **Newfoundland** | | | | |
| Employed | 86.8 | 4.1 | 9.1 | 100 |
| Unemployed | 16.8 | 66.4 | 16.9 | 100 |
| Not in Labour Force | 3.4 | 7.2 | 89.4 | 100 |

## Lowest Labour Market Flows, February-March, Newfoundland, 1984

| Labour Market Status In February 1984 / Labour Market Status in March 1984 | Employed | Unemployed | Not in Labour Force | Total[1] |
|---|---|---|---|---|
| | | (per cent ) | | |
| Employed | 95.5 | 2.1 | 2.4 | 100 |
| Unemployed | 12.2 | 74.2 | 13.6 | 100 |
| Not in Labour Force | 2.7 | 6.5 | 90.8 | 100 |

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Source of Tables 4-1 and 4-2: Statistics Canada Labour Force Survey special computer runs financed by the Economic Council of Canada.

[1] Totals may not add exactly because of rounding error.

labour market opportunities quite well without phoning an employer or answering an advertisement in a newspaper, as one would do in a larger urban centre, for example. Because they are not actively "looking" for a job, under Statistics Canada's definitions, these people are classified as not being in the labour force. For that reason, it is now agreed that the Unemployment Rate for Newfoundland understates the true extent of unemployment, and it should come as no surprise that the unemployment rate does not seem to have the same predictative power in regression analysis for Newfoundland that it has in provinces like Ontario and Alberta where the unemployment experience is probably measured more accurately by existing survey statistical methods.

It is also worth noting that there are probably some cultural differences between Newfoundland and Ontario that affect labour force participation rates: in responses to the Economic Council's 1979 work attitude survey, it appears that a lower proportion of working age people would take work in Newfoundland, even if it were available. In other words, the labour force participation rate would probably remain somewhat lower than it is in Ontario, even if jobs were equally available. While we have not had an opportunity to conduct another special work attitude survey since 1979, it is conceivable that the notable decline in Newfoundland birth rates that has occured since then might have associated with it a larger latent labour force participation rate.

## Provincial Labour Markets: Empirical Evidence

The Economic Council did not build an econometric model of the Newfoundland economy in preparation of *Newfoundland: From Dependency to Self-Reliance*, but it did perform a number of regressions reported in background studies (see Appendix B) and in Chapter 9. In the process of editing the books and discussion papers that were published concurrently with or after the Consensus Document on Newfoundland, the current author concluded that some rather simple econometric relations would be useful in illustrating the basic workings of the Newfoundland labour market (Copithorne 1981).

While there has not been time to build provincial econometric models, some very simple regressions run in double log form can demonstrate how statistical fits of the same functional form differ among provinces like Newfoundland, Ontario and Alberta. Ontario was chosen for comparison with Newfoundland because it is the destination which receives the largest number of out-migrating Newfoundlanders, and because it is at the political and geographic centre of the Canadian economy. Alberta was chosen not only because it has also been a major destination for Newfoundland out-migrants, but because, like Newfoundland, it is a periferal province in Confederation and has an economy dominated by the oil industry--an industry which may soon be of importance in Newfoundland. Alberta is also an interesting contrast with Newfoundland because its agricultural industry (in contrast to the Newfoundland fishery) is a private property resource industry in which most participants cannot qualify for unemployment insurance and from which there has been outmigration as technical improvements released labour from the industry.

## An Analytical Framework

Very simplistically, a provincial labour market can be visualized as a series of relationships involving the size of the working age population, the true supply of workers (if we could truly calculate the labour force participation rate in provinces like Newfoundland), the measured supply of labour, and the demand for labour (Figure 4-1). The size of a province's working age population is influenced by past birth rates and by migration which is, in turn, influenced by many factors including local wage levels and employment opportunities relative to those in other regions. The true supply of labour from within this working age population is also influenced by wage levels, income maintenance programs and employment opportunities. The demand for labour is influenced by the local productivity of labour relative to the productivity of labour in competing regions, by aggregate demand for local provincial product, and the local wage rate.

The wage level itself is determined by the rates of change of wages both within this region and elsewhere. The rate of change of wages may be influenced by the amount of unemployment and the number of job vacancies, and by wage levels, or rates of wage change both locally and in other regions, as well as by the characteristics of Unemployment Insurance and other income maintenance schemes. The "aggressiveness" manifested by the local wage-setting mechanism is related to cultural attitudes, the extent of unionisation, the strength of the desire to emulate wage rates in other regions, the generosity of Unemployment Insurance and many other factors.

The relative efficiency of the local labour market at matching unemployed people with job vacancies is reflected in the "people and jobs matching mechanism" (Figure 4-2). The less efficient the matching mechanism, the larger is the amount of unemployment that can exist for any given job vacancy rate, and vice versa.

Combining the people and jobs matching mechanism and the wage adjustment mechanism, it becomes possible to solve for the "natural rate of unemployment" in a particular region (Figure 4-2). The natural rate of unemployment is that rate of unemployment at which the local labour market is in equilibrium--equilibrium in the sense that wage expectations are being realised. Typically that would require that wage rates are rising at the expected rate of local price inflation plus the rate of expected technological advance. In a region where wage demands of the labour force are more "aggressive", the equilibrium rate of wage increase will be associated with a higher natural level of unemployment.

Many factors influence the natural rate of unemployment (if it exists). For example, increases in wage rates in other regions of the country, for whatever reason, may encourage Newfoundlanders to expect and demand higher wage rates for themselves, even though nothing may have changed locally to enable the economy to pay higher wage rates without laying off marginal workers. As a result, events outside the region may act to increase its own natural rate of unemployment. Evidence in earlier Council research by Riddell, and Swan and Kovaks (Appendix B) suggested that the 1971 liberalization of Unemployment Insurance served to increase the natural rate of unemployment in Newfoundland by several percentage points, and to a lesser extent in the rest of Canada. The recent MacDonald Commission report (MacDonald 1985) comes to the same conclusion.

## Figure 4-1

Schematic Representation of the Labour Market

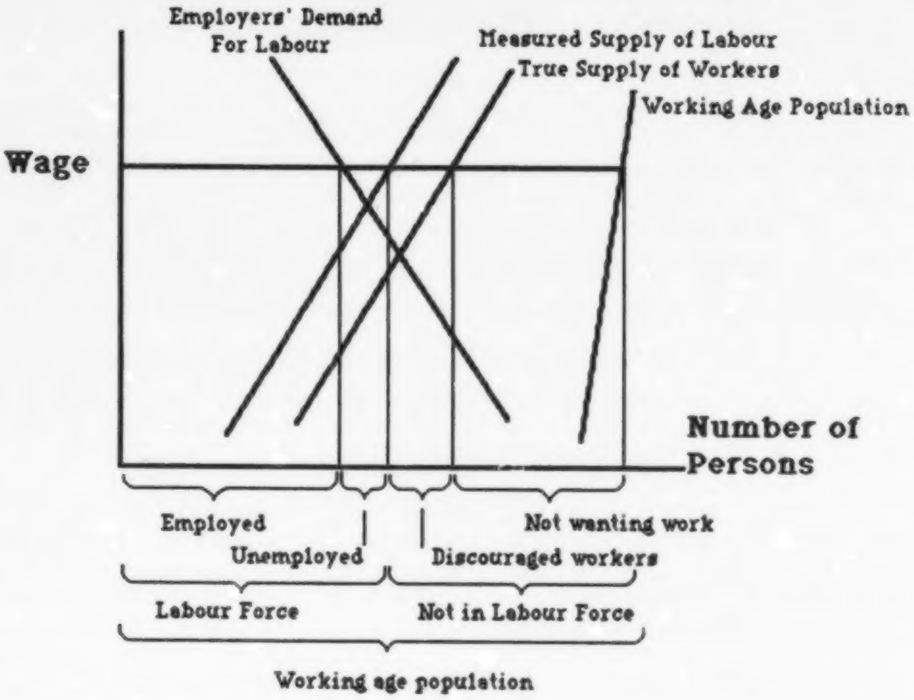
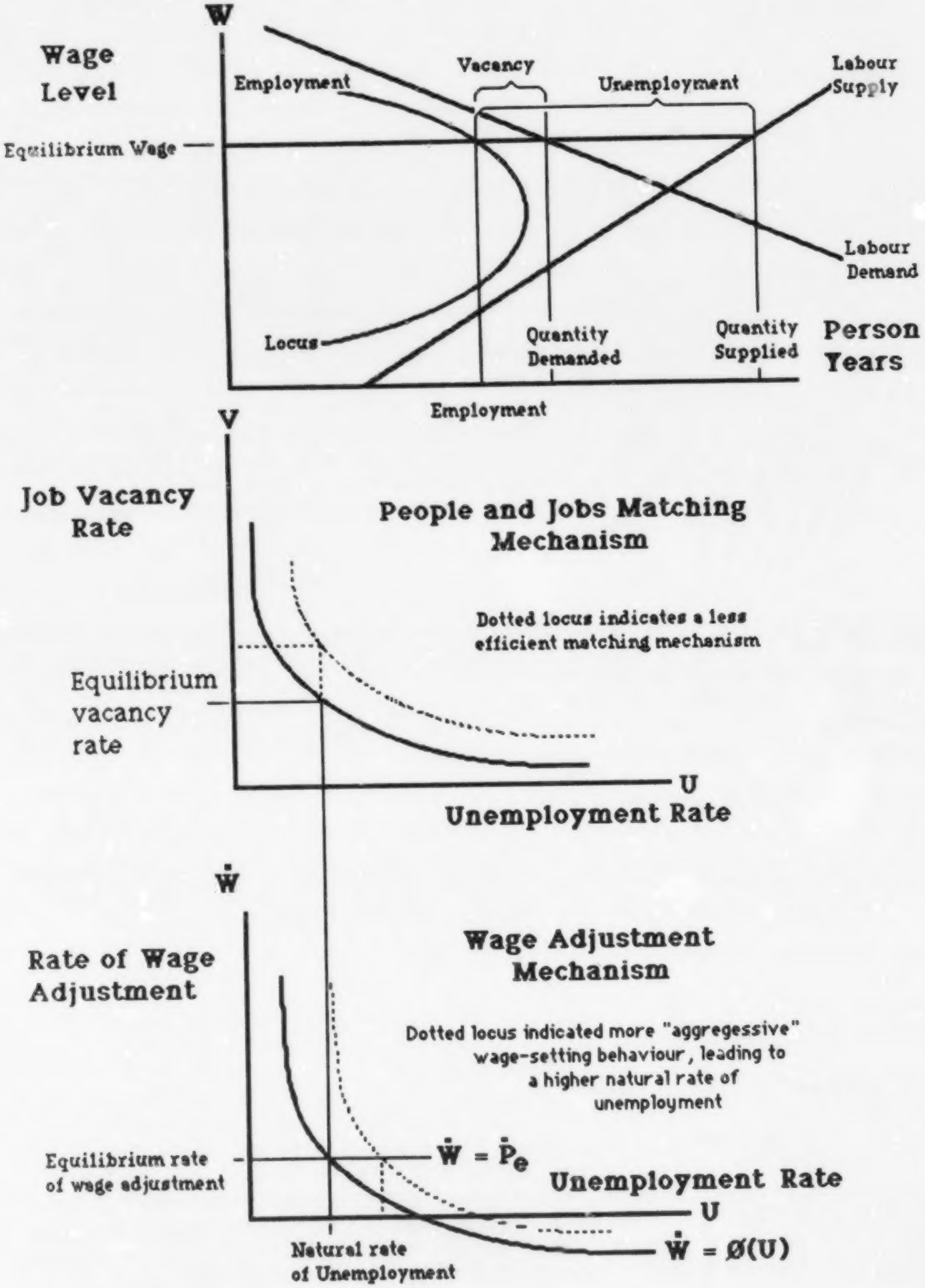

Employers' Demand For Labour
Measured Supply of Labour
True Supply of Workers
Working Age Population
Wage
Number of Persons
Employed
Unemployed
Discouraged workers
Not wanting work
Labour Force
Not in Labour Force
Working age population

Figure 4-2 Labour Market Mechanisms


W
Wage Level
Employment
Vacancy
Unemployment
Labour Supply
Equilibrium Wage
Labour Demand
Locus
Quantity Demanded
Quantity Supplied
Person Years
Employment
V
Job Vacancy Rate
People and Jobs Matching Mechanism
Dotted locus indicates a less efficient matching mechanism
Equilibrium vacancy rate
U
Unemployment Rate
$\dot{W}$
Rate of Wage Adjustment
Wage Adjustment Mechanism
Dotted locus indicated more "aggregessive" wage-setting behaviour, leading to a higher natural rate of unemployment
Equilibrium rate of wage adjustment
$\dot{W} = \dot{P}_e$
Unemployment Rate
U
$\dot{W} = Ø(U)$
Natural rate of Unemployment

A model of the regional labour market could involve the following relationships:

(1) Out-migration = $F_1$(W, W*, P, P *, E, E*,U,U*,In-migration, Births)
(2) In-migration = $F_2$(W, W*, P, P*, E, E*, U, U*, Out-migration)

where W is the local wage rate, W* is the wage rate is some target region like Ontario to which the worker might be attracted, or with whose workers he seeks some kind of wage parity. P and P* are price levels at home and in the target region, respectively. (Typically we would expect these variables to enter the regression as real wage rates W/P and W*/P*. E is the local level of employment (or some measure of job creation, or job vacancies) and E* is the level of this variable in some target region like Ontario or the rest of Canada to which the worker might be attracted. U is the local unemployment rate, and U* is the unemployment rate in the target region. Births is a fifteen year lagged variable representing the new entrants into the labour force who were born in the province. In-migration is influenced by out-migration and vice versa because a great deal of migration at any moment in time is really return migration.

(3) WAP = WAP(-1) - a*Out-migration + b*In-migration + new entrants - deaths

where WAP is working age population, a is the proportion of out-migrants who are of working age, b is the proportion of in-migrants who are of working age, 'new entrants' is the cohort of fifteen-year olds who have just come of working age, and 'deaths' represents the deaths of working age people. Because migration is influenced by interregional differentials in wages and job opportunities, a region's working age population is also a function of these interregional economic differentials.

(4) Participation Rate = $F_3$(W, P, E, T)

where W is the local wage rate, P is the local price level, E is a measure of local employment opportunities and T is a time trend or other variable that reflects changing cultural aspects which affect the labour force participation rate over time.

(5) LS = PART * WAP

where LS is labour supply, PART is the labour force participation rate, and WAP is working age population.

(6) LD = $F_4$(W, W*, P, X, GDP, YD)

where LD is the demand for local labour, W is the local wage rate, W* is the price of substitute labour in a region competing for the same jobs, P is the local price level, and X is a measure of exports reflecting the strength of foreign demand for the region's output. GDP is a measure of Canadian gross domestic product reflecting the level of aggregate demand in the rest of Canada for this region's output, and YD is a measure of local disposable income reflecting the strength of local aggegate demand for local output.

(7) U = (LS - LD)/LS

is the definition of the local unemployment rate.

(8) $V = F_5(U)$

is the definition of the People and Jobs Matching Mechanism where V is a measure of the vacancy rate and U is the unemployment rate.

(9) $\dot{W} = F_6(U, V, U^*, V^*, P_e, W, W^*, T)$

is the Wage Adjustment Mechanism where U, V, U* and V* are measures of unemployment and vacancy rates locally, and in some target region, reflecting labour market tightness at home and abroad. $P_e$ is a measure of price expectations, W is the local wage level, W* is the wage level in a target region. T is a time trend or other variable reflecting long term cultural change.

These nine relationships for any given region represent an interregional simultaneous equation system that can take considerable time and effort to estimate and test properly. Within the time and budget constraints of this project, the author has only been able to run a few preliminary regressions in log-linear form on quarterly CANSIM data in order to gain some impression of whether or not there is likely to be any empirical support for these hypotheses, and whether or not the relationships in Newfoundland are likely to be fundamentally different from those in Ontario or Alberta. There seem to have been few fundamental changes in any of the relationships since 1980, as least insofar as these can be picked up by dummy variables in ordinary least squares regressions.

## Migration

Our earlier research (Boadway and Green 1981, Winer and Gauthier 1982) suggested that out-migration was drawn by higher wages and greater job opportunities elsewhere. (Winer and Gauthier also measure a response to expectations of higher net fiscal benefits in regions like Alberta where large resource revenues gave expectations to a higher level of government services, lower tax rates and home owners' mortgage assistance, for example.) High rates of local unemployment or a large cohort of 16 year olds entering the labour force at home acted as push factors. Earlier Economic Council research suggested that about 50 per cent of Newfoundland's in-migration was actually Newfoundlanders returning. It seemed motivated by layoffs elsewhere, increases in relative wage levels in Newfoundland and improvements in job opportunities in Newfoundland.

From ECC Chart 3-1 it is clear that Newfoundland is a region of large net out-migration (sometimes losing 0.5 percent of its population in a single quarter (as in 1969) except during periods of national recession (1971, 1975 and 1982). The same chart demonstrates that Ontario has experienced relatively modest net in-migration (relative to the large size of its population), and that it strongly attracted people during 1969-70. But the Ontario economy was in trouble during the entire "Energy Decade" from 1974 until the signing of the Energy Pricing and Taxation Agreements with Alberta on September 1st, 1981, when Alberta agreed to accept the existence of the Petroleum and Gas Revenue Tax. At that point it became clear that Alberta would not be able to keep its huge energy rents to itself.

ECC Chart 3-1 demonstrates that Alberta has also been a region of in-migration in recent years, and that its surge of net in-migration mirrors Ontario's troubles during 1974-81. As soon as the September 1981 Energy Pact was signed, the flow of in-migration to Alberta tumbled and out-migration accelerated. By the third quarter of 1982 Alberta began losing population at an annual rate in excess of 2 per cent per year.

Average quarterly out-migration peaks in the second half of each year at about 3,800 persons from Newfoundland, 28,000 from Ontario and 18,000 from Alberta (Table 4-2). Out-migration from Alberta has been growing at about 0.5 per cent per year as many of its in-migrants leave again. Over the19 year period from 1966 through 1984 Newfoundland has lost almost 700 people every three months while Ontario and Alberta have respectively gained 2000 and 3000 every quarter.

## Table 4-2
## Average Quarterly Out-, In- and Net-Migration

| | Newfoundland | Ontario | Alberta |
|---|---|---|---|
| Average Quarterly Out-Migration 1966.2-1984.4 | | | |
| In the first quarter | 2,741 | 17,781 | 12,164 |
| In the second quarter | 2,111 | 16,895 | 12,061 |
| In third and fourth quarters | 3,748 | 28,277 | 18,253 |
| Average in all quarters | 3,087 | 22,783 | 15,182 |
| Average Quarterly In-Migration 1966.1 - 1984.4 | | | |
| In the first quarter | 1,827 | 19,822 | 15,043 |
| In the second quarter | 1,839 | 18,459 | 14,098 |
| In the third quarter | 3,303 | | |
| third & fourth quarters | | 30,443 | 21,903 |
| In the fourth quarter | 2,713 | | |
| Average in all quarters | 2,421 | 24,792 | 18,237 |
| Average Quarterly Net In-Migration | | | |
| Average in all quarters | -666 | 2,009 | 3,055 |

Source: Dummy variable regressions run on CANSIM data.

## Out-migration

Current back migration seems to be important in all regions, and it seems to be quick; current in-migration (with no lags) is strongly significant in all out-migration regressions; the coefficients suggest that a 1 per cent increast in current in-migration to Alberta or Ontario will be associated with a 0.7 per cent increase in out-migration (probably back-migration) within the same three month period (Table 4-3). But a 1 per cent in-migration to Newfoundland will be associated with only a 0.18 per cent increase in out-migration. It looks like a lot of the in-migration to Newfoundland is made up of Newfoundlanders coming home to stay. By contrast, in-migration to Ontario or Alberta looks like seekers of fortune--about 70 per cent of whom either leave or are driven out again within a matter of weeks.

Only in Newfoundland does the pressure of native-born labour force entrants seem to significantly push out-migration. A 1 per cent increase in births 16 years ago in Newfoundland is associated with a 0.67 per cent increase in out-migration, other things constant. (Whereas about 95 percent of all persons living in Newfoundland were born there, in-migration to Alberta and Ontario has been so large that many of the young labour force entrants might have spent part of their schooling in those provinces, but have been born elsewhere.)

Unemployment rates (the Newfoundland rate excepted) are significant in pushing and pulling out-migration. Depending on the regression, a 1 per cent increase in unemployment in Alberta will cause somewhere between a 0.44 and 0.88 per cent increase in out-migration from that province.

Newfoundland out-migration seems to be more significantly influenced by unemployment rates and levels of employment in Ontario than in Canada at large. A 1 per cent increase in Ontario employment will cause a very large 3.4 per cent increase in Newfoundland out-migration--but no significant out-migration from Alberta. Albertan out-migration is more strongly drawn by job creation elsewhere in Canada than in Ontario alone.

Changes in real wages (as measured by average weekly earnings deflated by the relevant consumer price index) seem to affect Newfoundland out-migration in the expected direction but the forces are not very strong.

## In-Migration

Apparent back-migration in the current quarter (proxied by current out-migration) is always strongly significant, and other lag structures are not significant. It appears that a 1 per cent increase in current out-migration will be associated with a 0.39 per cent increase in in-migration to Newfoundland, a 0.44 per cent increase in in-migration to Ontario and a 0.68 per cent increase in in-migration to Alberta. If someone leaves Newfoundland this quarter, there a smaller probability that he will return in the same quarter than is true for Ontario or Alberta.

Newfoundland in-migration is not well explained by any variable except the proxy for back-migration. Growth in employment opportunities in Newfoundland and Ontario both have the expected sign and have an apparent weak effect on Newfoundland in-migration.

## Table 4-3
## Out-migration 1966.1 - 1984.4
## Best Explanatory Logarithmic Regressions

| | Newfoundland | Ontario | Alberta |
|---|---|---|---|
| Constant | -18.04 | 3.06 | -28.92 |
| First quarter dummy | -.23 | -.15 | -.14 |
| Second quarter dummy | -.51 | -.15 | -.09 |
| **Elasticities** | | | |
| Current in-migration (back-migration) | 0.18 | 0.73 | 0.70** (or 0.3) |
| Birth rate 16 years ago (new entrants) | 0.67 | ns | ns |
| Unemployment rate in: | | | |
| Newfoundland | +ns | - | - |
| Ontario | -.59 | +s | -s |
| Alberta | -ns | -.19 ns | 0.44** (or 0.88) |
| Canada | -s | -s | -s,ns |
| Employment level in : | | | |
| Newfoundland | -1.47 ns | perverse | - |
| Ontario | 3.42 | perverse | +ns |
| Alberta | +ns | perverse | -ns, s |
| Canada | +ns | +ns | -s, ns |
| Real wage in: | | | |
| Newfoundland | -s, ns | - | - |
| Ontario | +ns | perverse | - |
| Alberta | - | +ns | -2.52 |
| Canada | +ns | +ns | -s, ns |
| Serial correlation coefficient AR(1) | ns | 0.75 | 0.75 |
| Adjusted $R^2$ | 0.70 | 0.77 | 0.89 |
| Durbin Watson | 1.84 | 2.35 | 2.44 |
| F-Statistic | 25.54 | 49.5 | 64.39 |

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Source: Ordinary least squares regressions run in double log form on CANSIM data. Only the 'best' regression (or one of the better regressions) is reported. All numerical coefficients reported are significant at the 5% level of confidence unless 'ns' is specified after the number.

'ns' means not significant. '+s' means positive and significant in other regressions in which this variable was included. '+ns' means not significant with a positive sign frequently occuring in other regressions in which this variable was included. '-s' and '-ns' have analagous meanings.

** This variable had a significant value that was quite different from the one reported in the best regression (see the alternate magnitude in brackets.)

Ontario in-migration is significantly pushed by increased unemployment in Alberta, and pulled by reductions in unemployment in Ontario. Employment and wage variables do not give satisfactory results.

Alberta in-migration is strongly influenced by job opportunities as both the unemployment rate and employment variables have the expected sign, with the unemployment variable being the stronger of the two.

Table 4-4
In-migration 1966.1 - 1984.4
Best Explanatory Logarithmic Regressions

| | Newfoundland | Ontario | Alberta |
|---|---|---|---|
| Constant | 9.65 ns | 5.91 | 1.56 |
| First quarter dummy | -0.26 | -0.21 | -0.10 |
| Second quarter dummy | -0.15 ns | -0.29 | -0.17 |
| Third quarter dummy | 0.21 | ns | ns |
| **Elasticities** | | | |
| Current out-migration (back-migration) | 0.39 | 0.44 | 0.68 |
| Unemployment rate in: | | | |
| Newfoundland | ns | - | - |
| Ontario | 0.08 ns | -0.48 | ns |
| Alberta | - | 0.48 | -0.44 |
| Employment level in : | | | |
| Newfoundland | -0.74 ns | - | - |
| Ontario | -1.08 | perverse | ns |
| Alberta | - | -ns | 0.37 ns |
| Real Wage in: | | | |
| Newfoundland | perverse | - | - |
| Ontario | perverse | perverse | perverse |
| Alberta | - | perverse | perverse |
| Serial Correlation Coefficient AR(1) | 0.54 | 0.47 | 0.76 |
| Adjusted $R^2$ | 0.68 | 0.82 | 0.87 |
| Durbin Watson | 2.21 | 2.36 | 2.60 |
| F-Statistic | 20.08 | 55.18 | 88.94 |

Source: Ordinary least squares regressions run in double log form on CANSIM data. See footnotes to Table 4-3.

## Working Age Population

One can define working age population in any quarter as the level of working age population of the corresponding quarter one year ago, plus the net in-migration of working age people over the past year, plus the new cohort of 15 year olds, less deaths. Lacking immediate access to any of these data, simple regressions of the annual change in working age population were run on cumulative in-migration and out-migration over the past year, and on the province's total births 15 years ago (Table 4-5).

From this crude proceedure, it would appear that 75 to 89 percent of Alberta's migrants have been working age people whose economic behaviour would be strongly influenced by economic opportunities. It is predominantly young singles and married couples who are entering and leaving Alberta.

By contrast, over half of the in-migrants to Newfoundland appear to be children; apparently only 46 per cent are working age. About half (60 percent in some other regressions) the persons leaving Newfoundland seem to be of working age. Hence one would expect that back-migration to Newfoundland will be less closely related to labour market phenomena, and out-migration will be more closely related to labour market conditions--exactly what appears in the regressions reported in Table 4-4. If we had accurate data on the migration of working age males, we would probably get much better explanatory regressions for migration.

Table 4-5
The Influence of Migration and Births on the Annual Change in Working Age Population, 1967.2-1984.4

| | Newfoundland | Ontario | Alberta |
|---|---|---|---|
| Constant term | 8.84 | ns | 43.77 |
| Province's births 15 years ago | ns | 0.65 | ns |
| In-migration over the past year | 0.44 | 0.53 | 0.75 |
| Out-migration over the past year | -0.50[1] | -0.32 | -0.89 |
| Serial correlation coefficient AR(1) | 0.82 | 0.96 | 0.97 |
| Adjusted $R^2$ | 0.85 | 0.96 | 0.99 |
| Durbin-Watson statistic | 1.71 | 0.72 | 1.10 |
| F-statistic | 134 | 611 | 3255 |

Source: Ordinary least squares regressions on CANSIM data.

[1] In some regressions the proportion ofNewfoundland outmigrants who are of working age has been as high as 0.63.

Ontario appears to be the recipient of predominantly working age people through in-migration, but most of its out-migrants seem to be children. Evidently the primary outmigrants from Ontario must be mobile breadwinners who take a wife and several children with them. It is conceivable that the in-migrants to Alberta from Ontario have been predominantly rising managerial class in their thirties and forties while the in-migrants to Alberta from Newfoundland have been younger working class. The managerial in-migrants from Ontario probably move to offices in Calgary or Edmonton while the Newfoundland migrants probably move to technical, construction and labouring jobs in places like Fort McMurray (where Newfoundlanders are apparently the most numerous group).

It appears that something like 65 percent of Ontario-born children are still living in the province when they become of working age. The variable representing births 15 years ago was insignificant in Newfoundland (surprisingly) and in Alberta. Presumably there has been so much inter-regional migration of children between their birth and their 15th birthday that the correlation between changes in a province's working age population and its previous births has become weak.

The regressions on the definition of working age population assume that the economic factors influencing the size of a province's working age population will be obtain by substituting the earlier regressions on in- and out-migration (Table 4-3 and 4-4). One could, however, short-circuit the process by running regressions of changes in working age population on the inter-regional economic variables (Table 4-6). However, migration is a rather small part of working age population at any moment in time, so the effects of the economic variables tend to get blotted out. Suffice it to say that the evidence suggests that the migration of breadwinners is indeed influenced by economic variables, so that the size of a province's working age population is also influenced by them.

## Participation Rate

The econometric results for participation rates contain serious autocorrelation problems. Correction for autocorrelation destroys the significance of all variables except the level of employment. Therefore the uncorrected results are presented both in linear and log form (Table 4-6). While the regressions are of very dubious reliability, they do suggest some interesting and unexpected hypotheses.

The only safe conclusion is that increases in the level of employment will significantly increase the labour force participation rate in all regions, particularly in Newfoundland. Using 1984 data, a one percent increase in the level of employment (about 1760 jobs) would increase labour force participation in Newfoundland by about 0.70 per cent (about 1547 persons). That represents a decline of 213 persons among 45,000 unenemployed people, or about a 0.5 % decline in the number of unemployed. Clearly job creation will have almost no effect on the level of unemployment in Newfoundland.

To the extent that job creation in Newfoundland raises incomes in Canada as a whole, it is worth doing. But as a means of reducing Newfoundland's unemployment rate, it is a hopeless policy. If jobs are transferred to Newfoundland at the opportunity cost of reducing employment in other regions where Gross Domestic Product per worker is higher, the policy is doubly doubious.

In Ontario, by comparison, a one per cent increase in employment (about 42,000 jobs) will induce only a 0.45 per cent increase in the labour force (about 21,000 persons). That represents a decline of 21,000 persons among 423,000 unemployed people, or a 5%

decline in the number of unemployed. In Ontario you have to create two jobs to reduce unemployment by one person; but that is still a ten times stronger reduction in unemployment than the same policy could achieve in Newfoundland. And, to the extent that Gross Domestic Product per worker is higher at the margin in Ontario than in Newfoundland, the whole country would be better off to locate the job in Ontario.

The participation rate is one of the few cases where a dummy variable for the years 1980 to 1984 was significant. It suggests a statistically significant decline in the labour force participation rate in Newfoundland, other things constant (Table 4-6).

One of the most striking features of Table 4-6 is that the wage and price index variables have unexpected signs. Whereas one would have expected the elasticity coefficients of average hourly earnings in manufacturing and the local consumer price indes to be roughly equal and opposite in sign (with the wage coefficient positive) the reverse is true, especially for Ontario. If wages go up, people work less; if the cost of living goes up, they go back to work. This does not necessarily mean that the regressions are totally wrong. They could be suggesting that Ontario and Alberta have entered a backward-bending portion of the labour supply curve where further wage increases will actually reduce labour force participation.

## Table 4-6
## Participation Rates

| | Newfoundland | Ontario | Alberta |
|---|---|---|---|
| **Best Linear Regressions** | | | |
| Constant | 17.95 | 35.87 | 51.30 |
| Employment | 0.22 | 0.008 | 0.015 |
| Average Hourly Earnings in Mfg. | 0.75 | -0.389 ns | -1.267 |
| Regional Consumer Price Index[1] | -0.028 | 0.031 | 0.055 |
| Time[2] | -0.054 | -0.093 | 0.061 |
| Adjusted $R^2$ | 0.96 | 0.99 | 0.99 |
| Durbin-Watson statistic | 0.55 | 0.61 | 1.08 |
| F-statistic | 396 | 1315 | 1310 |
| **Best Double Logarithmic Regressions, Elasticities** | | | |
| Employment | 0.70 | 0.45 | 0.61 |
| Average Hourly Earnings in Mfg | .057 ns | -0.023 | -0.379 |
| Consumer Price Index | .088 | 0.129 | 0.127 |
| Time | -0.004 | -0.003 | 0.003 |
| 1980-84 Dummy | -0.029 | | |
| Adjusted $R^2$ | 0.97 | 0.99 | 0.93 |
| Durbin-Watson statistic | 0.64 | 0.82 | 0.22 |
| F-statistic | 573 | 2490 | 333 |

Source: Regressions on CANSIM data

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1. Consumer price indices used were for St. John's, Toronto and Calgary.
2. The sign of this variable is unstable, depending upon what other variables are present.

## Labour Supply

The labour supply should simply be the labour force participation rate times the working age population where working age population is a function of in- and out-migration, past birth rates and so on.

$$
\begin{aligned}
LS &= PART * WAP \\
&= F_3(W, P, E, T) * [WAP(-1) \\
&\quad - a*F_1(W, W*, P, P*, E, E*, U, U*, \text{In-migration, Births}) \\
&\quad + b* F_2(W, W*, P, P*, E, E*, U, U*, \text{Out-migration}) \\
&\quad + \text{new entrants} \\
&\quad - \text{deaths}
\end{aligned}
$$

However, our previous OLS equations are of dubious fits, to say nothing ot the obvious simulataneous equation problem in the migration equations. So, it might be advisable to fit labour supply functions directly to the explanatory variabies (Table 4-7). The measured labour force is taken as a proxy for labour supply. The unemployment rate in the target region (Ontario or Alberta) is taken as a proxy for workers' employment opportunities in the alternative region to which they could migrate, or towhich they might return.

If one fits linear regressions with a time trend and omits the birth rate 16 years ago, both Alberta and Ontario give backward sloping supply curves, although the one in Ontario is not statistically significant, and it has a perverse relationship with rate of unemployment in Alberta. If one omits the time trend and includes the birth rate 16 years ago as a proxy for new labour force entrants, the evidence in favour of a backward sloping supply curve is reduced.

In logarithmic regressions, past birth rates are not significant. Leaving them out, Ontario exhibits an upward sloping labour supply curve, but the slope of Alberta's labour supply curve is still in doubt because both the wage variable and the price level have the same sign and are statistically significant.

Again serial correlation is present so none of the regressions are very reliable. Nevertheless these various regressions taken as a group do constitute a certain amount of imperfect empirical evidence that is suggestive of a number of important hypotheses:

- In all three provinces, a one percent increase in employment will induce a substantive increase in the size of the labour force--about 0.7 percent more in Newfoundland (which fits the participation rate regression perfectly) and somewhat smaller percentage increases in Ontario and Alberta.
- Whereas Newfoundland still seems to have a normal upward sloping supply curve for labour, there is some doubt about the slope of the labour supply curve in both Ontario and Alberta.
- The labour supply in each province is significantly related to the extent of unemployment in other provinces to which its workers might migrate, or from which past migrants might return. Migration matters. It is responsive to economic variables.
- Local job creation may raise incomes in the region, but it will have a weak effect on reducing unemployment, especially in Newfoundland. That is because an increase in job opportunities will induce more people to enter the labour force, and it will induce a certain number of in-migrants from other regions.

Table 4-7
Labour Supply

| | Newfoundland | Ontario | Alberta |
|---|---|---|---|
| **Linear Regression with a time trend** | | | |
| Constant | 24.62 | 2018.74 | 119.22 |
| Local employment level | 0.84 | 0.27 | 0.58 |
| Average hourly earnings in mfg. | 3.84 | -7.71 ns | -14.34 |
| Consumer price index | -0.12 | 0.16 ns | 1.75 |
| Unemployment rate in Ontario | 0.86 | | 3.29 |
| Unemployment rate in Alberta | | -10.26 (perverse) | |
| Time trend | 0.44 | 22.74 | 2.11 |
| Adjusted $R^2$ | .99 | .99 | .99 |
| Durbin-Watson statistic | 0.69 | .68 | .61 |
| F-statistic | 2240 | 11867 | 28768 |
| **Best Linear Regression** | | | |
| Constant | -7.30 ns | 282.17 | 74.25 |
| Local employment level | 1.01 | 0.78 | 0.62 |
| Average hourly earnings in mfg. | 5.53 | 88.36 | 7.61 ns |
| Consumer price index | -0.12 | -0.93 ns | 1.12 |
| Local birth rate 16 years ago | 0.003 | 0.009 | 0.006 |
| Unemployment rate in Ontario | 1.53 | | 3.08 |
| Unemployment rate in Alberta | | 6.83 | |
| Adjusted $R^2$ | 0.99 | 0.99 | .99 |
| Durbin-Watson statistic | 0.79 | 0.65 | 0.48 |
| F-statistic | 1955 | 6687 | 15143 |
| **Best Logarithmic Regression: Elasticities** | | | |
| Constant | 1.67 | 2.77 | 7.01 |
| Local employment level | 0.72 | 0.68 | 0.55 |
| Average hourly earnings in mfg. | 0.20 | 0.19 | 0.09 |
| Consumer price index | -0.09 | -0.08 | 0.16 |
| Unemployment rate in Ontario | 0.01 ns | | 0.025 |
| Unemployment rate in Alberta | | 0.009 | |
| Adjusted $R^2$ | 0.99 | 0.99 | 0.99 |
| Durbin-Watson statistic | 0.77 | 0.61 | 0.26 |
| F-statistic | 3318 | 15826 | 13223 |

Source: Ordinary least squares regressions on CANSIM data.

## Labour Demand

We hypothesize that the demand for labour in a region rises with local disposable income, the size of foreign demand for the regions's output, and the size of domestic demand in Canada. We also hypothesize that the demand for local labour rises as the local real wage falls and as real wages rise in the rest of Canada. That is, we would expect there to be a diminishing marginal value product for local labour, and that labour in the rest of Canada would be a substitute for local labour so footloose industries would move out of the region as the local wage rate increased relative to other regions in Canada.

Provincial employment is the proxy for the quantity of labour demanded. Total exports deflated by the Laspeyres Export Price Index is the proxy for foreign demand. Canadian Gross Domestic Product in 1971 dollars is the proxy for Canadian demand. Provincial average hourly earnings in manufacturing divided by the 1971 based consumer price index for St. John's, Toronto and Calgary are the proxies for the real wage rate in Newfoundland, Ontario and Alberta, respectively. The demand for labour is significantly related to provincial retail sales[1] but the explanatory power of this local aggregate demand variable is robbed by real Canadian GDP. Hence the proxy for local aggregate demand was dropped from the regressions (Table 4-8).

Average weekly earnings were not generally as satisfactory a proxy for provincial wages as were average hourly earnings in manufacturing. Including the real wage for competing regions weakened the significance of the regressions: there is a suggestion that a fall in the real Ontario wage would reduce the demand for Newfoundland labour (suggesting that Ontario labour could substitute for Newfoundland labour) but the effect is not statistically significant. Similarly the cross elasticities of demand for Ontario and Alberta labour are not statistically significant.

Regressions were presented with and without correction for serial correlation to demonstrate that the sizes of the labour demand elasticities are fairly stable for Ontario, but less so for Newfoundland and Alberta. Introduction of the Arima variable for serial correlation robs the real wage rate of its explanatory power for the two smaller provinces so the wage variable was dropped from the serially corrected regression in their cases.

The results suggest that, corrected or not, the Alberta economy is much more export-oriented than Ontario. Without correction for serial correlation, the Newfoundland labour demand elasticities are very close to Ontario, but upon correction, it appears that Newfoundland is indeed more export-oriented than Ontario, and that its labour demand is more weakly influenced by changes in Canadian Gross Domestic Product, which one would expect of a periferal provincial economy whose fish and forest exports are largely destined for overseas markets.

For Ontario, a one per cent increase in Canadian GDP (of which Ontario is itself a large part) apparently increases the level of Ontario employment by 0.65 per cent whereas a one per cent increase in exports apparently raises Ontario employment by only 0.07 per cent. A drop in the Ontario wage will increase the demand for labour by only 0.16 to 0.19 per cent.

## Table 4-8
## Provincial Labour Demand Elasticities

| | Newfoundland | Ontario | Alberta |
|---|---|---|---|
| **Without Serial Correlation Correction** | | | |
| Constant | -3.49 | 0.22 ns | 1.13 ns |
| Elasticities | | | |
| Real Exports | 0.06 | 0.075 | 0.42 |
| Real Canadian GDP | 0.66 | 0.62 | 0.34 |
| Local Real Wage | -0.20 | -0.19 | -0.11 ns |
| Adjusted $R^2$ | 0.95 | 0.99 | 0.98 |
| Durbin-Watson statistic | 0.88 | 0.83 | 0.16 |
| F-statistic | 336 | 3503 | 826 |
| **Serial Correlation Corrected, Constant Surpressed** | | | |
| Elasticities | | | |
| Real Exports | 0.10 | 0.07 | 0.14 |
| Real Canadian GDP | 0.41 | 0.65 | 0.56 |
| Local Real Wage | - | -0.16 | - |
| Correlation coefficient AR(1) | 0.70 | 0.60 | 0.98 |
| Adjusted $R^2$ | 0.97 | 0.99 | 0.99 |
| Durbin-Watson statistic | 1.55 | 1.80 | 1.45 |
| F-statistic | 818 | 4861 | 13412 |

Source: Ordinary least squares regression in double logarithmic form on CANSIM data.

Indeed the data suggest that labour demands are both price and income inelastic in all three provinces. A one per cent increase in Newfoundland's wage may reduce labour demand by 0.2 per cent or less. Clearly labour union action to raise Newfoundland wage rates (already at or above the national average in sectors where data are collected by Statistics Canada) will reduce employment, but increase labour's aggregate income. Further increases in Newfoundland relative wages may also tend to shift footloose industries to Ontario, but the insignificance of the cross price elasticity is consistent with the idea that most of the industries that could get out of Newfoundland did so a long time ago--probably between 1949 and 1955 when, just after Confederation, many of Newfoundland's indigenous manufacturing industries closed (Economic Council, 1980).

Evidence is unclear with respect to the price elasticity of demand for Alberta labour; it is apparently negative, but not statistically different from zero. Conceivably the demand for Alberta labour has been quite price inelastic during most of the energy crisis years from 1974 to 1981. During that period oil companies (for whom labour costs are a small part of total expenditures) were very active employers, and when there was a lot of speculative construction activity in spite of soaring wage costs. The fact that Alberta was the recipient of a lot economic rent during those years may have resulted in a part of those rents being capitalized into labour's wage, thereby manifesting a very price inelastic demand for labour during that time period.

## Labour Market Efficiency: The People and Jobs Matching Mechanism

In theory, as unemployment rises, jobs are harder to find and workers are more readily available. Therefore employers should have fewer unfilled job vacancies and there should be a decline in the help wanted index. On the other hand, when labour is scarce because there is little unemployment, employers should have more trouble filling jobs and job vacancies, proxied by the help wanted index, should rise as employers advertise more intensively.

The results in Table 4-9 suggest that the Newfoundland unemployement rate, as usual, does not give statistically significant results. For Ontario, Alberta and Canada as a whole, however, the people and jobs matching mechanism is a statistically significant relationship. From the sizes of the constant coefficient, the labour market matching mechanism is more efficient in Alberta and Ontario than it is in Canada as a whole. There is no a statistically significant people and jobs matching mechanism for Newfoundland.

Table 4-9
Estimating the Unemployment-Vacancy Locus by Province 1966.3 - 1984.4

| | | | |
|---|---|---|---|
| Newfoundland | $\log V = 3.15 + 0.61 \log U$<br>(3.02) (1.63) | $AR(1) = 0.86$<br>(12.20) | $R^2 = 0.70$ |
| Ontario | $\log V = 5.72 - 0.74 \log U$<br>(16.96) (-4.57) | $AR(1) = 0.86$<br>(15.37) | $R^2 = 0.88$ |
| Alberta | $\log V = 5.15 - 0.63 \log U$<br>(25.58) (-5.96) | $AR(1) = 0.87$<br>(15.91) | $R^2 = 0.95$ |
| Canada | $\log V = 7.02 - 1.18 \log U$<br>(13.29) (-7.87) | $AR(1) = 0.94$<br>(60.54) | $R^2 = 0.95$ |

or taking antilogs:

| | |
|---|---|
| Newfoundland | not significant |
| Ontario | $U^{0.74}V = 305 = e^{5.72}$ |
| Alberta | $U^{0.63}V = 172 = e^{5.15}$ |
| Canada | $U^{1.18}V = 1119 = e^{7.02}$ |

Source: Ordinary least squares regressions of the regional help wanted index on the provincial unemployment rate in double log form, t-statistics are in brackets.

## Wage Adjustment Mechanisms

Average weekly earnings and average hourly earnings in manufacturing are the two readily available wage series. They can be deflated by the Consumer Price Indexes for St. John's, Toronto and Calgary to obtain regional real wage rates. Both wage statistics may be less satisfactory as proxies for wage rates in Newfoundland than elsewhere because they are dominated by data from larger establishments, of which there are relatively few in Newfoundland. Also, the industry coverage is narrower in Newfoundland for that reason.

From 1971 through 1984, average weekly earnings in Newfoundland were 7 percent below Ontario on average, although the gap ranged from 14.7 per cent to 1.4 per cent below Ontario during this period (New Chart 3-2). Meanwhile, Alberta's average weekly earnings have run from some 3% below Ontario in 1972 to some 15 per cent above Ontario in the third quarter of 1982. Clearly there has been some regionally independent movement of average weekly earnings.

Many wage adjustment hypotheses are possible. We shall proceed to test a series of them, beginning with the simplest.

## 1. The Direct Wage Parity Hypothesis

One simple theory is that nominal wages in periferal regions like Alberta and Newfoundland are set to emulate the average nominal wage level in Ontario or Canada as a whole, without regard to changes in price levels (Table 4-10). In this simple form, lagged regressions give poorer results. If wage *level* emulation is relevant, it seems to be immediate. Such a simple model fits Newfoundland experience, but it is quite poor as an explanation of Alberta's wages, which clearly have not continued to rise at 20% of the Ontario wage during the post 1981 period as this regressions implies.

Table 4-10
Direct Wage Rate Emulation, 1966.2 - 1984.4

| | Newfoundland | | Alberta | |
|---|---|---|---|---|
| Dependent Variable | Ave. weekly earnings | Ave. hourly earnings in mfg. | Ave. weekly earnings | Ave. hourly earnings in mfg. |
| Constant | -8.22 | -0.85 | -33.77 | -.60 |
| Ontario wage counterpart | 0.96 | 1.03 | 1.20 | 1.19 |
| AR(1) | 0.65 | 0.61 | 0.88 | 0.86 |
| $R^2$ | 0.99 | 0.99 | 0.99 | 0.99 |
| Durbin-Watson statistic | 1.88 | 1.28 | 2.28 | 1.76 |
| F-statistic | 15706 | 3346 | 88072 | 34480 |

## 2. Wage Parity Adjustment Hypothesis

Under this hypothesis, percentage wage *changes* in perifieral regions closely emulate wage *changes* in central regions. There is support for this hypothesis (Table 4-11). The changes in average weekly earnings (which include overtime payments) seem to be immediate, and during the 1966-1984 period, wage increases in Newfoundland and Alberta both tended to exceed the wage increases in Ontario. With respect to average hourly earnings, the Alberta wage adjustments are related to Ontario wage changes with statistically significant time lags. (It takes time for union contracts to come due and be renegotiated.) Changes in Alberta average hourly earnings track changes in Ontario average hourly earnings better than the reverse.

Table 4-11
Wage Change Emulation, 1966.2 - 1984.4

| | Newfoundland | Alberta | |
|---|---|---|---|
| Dependent Variable | Per cent quartly change in | Per cent quarterly change in | |
| | Ave. weekly earnings | Ave. weekly earnings | Ave. hourly earnings in mfg. |
| Constant | ns | ns | -0.01 |
| Ontario wage change | 1.04 | 1.09 | 0.40 |
| Ontario wage change(-1) | | | 0.53 |
| Ontario wage change(-2) | | | 0.61 |
| Adjusted $R^2$ | 0.12 | 0.46 | 0.37 |
| Durbin-Watson statistic | 2.39 | 2.74 | 1.84 |
| F-statistic | 182 | 236 | 14 |

Source: Ordinary least squares regression on CANSIM data.

## 3. Crude Walrasian Adjustment

Under this hypothesis, one uses the local unemployment rate as a measure of slackness in the labour market. One would expect percentage wage changes to be an inverse function of the unemployment rate. There is no such significant relation for either Newfoundland or Ontario, but there seems to be one for Alberta (Table 4-12). The elasticities of the demand and supply of labour have apparently been inelastic and of dubious magnitude during the past decade, but wage adjustment has apparently been flexible in both directions and sensitive to the extent of local unemployment. The Alberta labour market which is much less unionized than Ontario or Newfoundland industry is apparently much more neoclassical and flexible in its operation than is true of the other two provinces.

Table 4-12
Relationships Between Alberta Wage Changes and Its Unemployment Rate,

| Dependent Variable | Percent change in average weekly earnings | | | Per cent change in average hourly earnings in manufacturing | |
|---|---|---|---|---|---|
| Constant | 0.3[1] | 0.013[1] | 0.005[2] | 0.038[1] | 0.007[1] |
| Unemployment rate (U) | -0.0018 | | | -0.0027 | |
| Inverse U rate (1/U) | | 0.43 | 0.09 | | 0.076 |
| $R^2$ | 0.08 | 0.03 | 0.21 | 0.17 | 0.12 |
| Durbin-Watson statistic | 2.41 | 2.36 | 2.31 | 1.72 | 1.62 |
| F-statistic | 7.17 | 3.49 | 9.02 | 15.56 | 10.4 |

Source: Ordinary least squares regressions on CANSIM data.
1. 1976.2 - 1984.4
2. 1977.1-1984.4

Craig Riddel (Appendix B) has suggested running the wage adjustment mechanism in inverse form:

$$U = a_o + a_1\Delta W + a_2\Delta W^2 + a_3P_e + a_4t + \ldots$$

where U is the unemployment rate, $\Delta W$ is the rate of change of wages, $P_e$ is price expectations, and t is time. These kinds of regressions were not significant in the three provinces using the current data base.

## 4. Walrasian Adjustment in the Presence of a Matching Mechanism

It can be argued that wage rate adjustment is responsive to both the level of unemployment, U, and the level of job vacancies, V. That is,

(1) $\Delta W/W = \O(U,V)$

For example we could regress

(2) $\Delta W/W = aU + bV + \varepsilon$

where a and b are parameters and $\varepsilon$ is the stochastic error term.

The, substituting in the previously estimated people and jobs matching mechanism

(3) $\text{Log } V = \alpha + \beta \log U$ or $V = kU^{\beta}$

into the wage adjustment relation (1), we can solve for the natural rate of unemployment which would make wage inflation zero,

i.e. $U = (-a/bk) \exp 1/(\beta-1)$

In this model the natural rate of unemployment can be reduced by improving the matching mechanism (reducing k) through improving urban structure, better transportation and better communications, for example. The natural rate of unemployment can also be reduced by reducing the "aggressiveness" of the wage adjustment mechanism. This can be achieved by policies which reduce the responsiveness of the rate of wage change to the job vacancy rate (reducing the size of parameter b) and by policies that will increase the responsiveness of the rate of wage change to the level of unemployment (making parameter 'a' more negative). The level of the government's minimum wage, the generosity of unemployment insurance, and the power and aggressiveness of labour unions are believed to play important roles in the "aggressiveness" of the wage setting mechanism. These three forces are all strong in Newfoundland, weak in Alberta.

Current regressions of the Walrasian wage adjustment mechanism (2) are not very satisfactory, but the coefficients have the right signs in all regressions. Wage inflation in Newfoundland is significantly related to the Atlantic Canada help wanted index. Alberta's wage adjustment is significantly related to the unemployment rate. It is conceivable that Newfoundland wage setting is more flexible upward than it is downward. Alberta's wage rate is flexible downward because a lot of workers have actually swallowed wage cuts since 1982. The help wanted index, as a proxy for job vacancies, is not a strong variable in Ontario. The prairie help wanted index is a poor proxy for what went on in Alberta during 1971-1984. (There is no Alberta or Newfoundland help wanted index; the Prairie and Atlantic Canada help wanted indexes were used.)

## 5. The Price Expectations Augmented Phillips Curve

The above Walrasian adjustment mechanism (2) can be augumented by a price expectations variable, and a proxy for technological advance. The natural rate of unemployment would be that rate of unemployment where wage inflation was equal to the rate of expected price inflation plus the expected rate of technological advance.

Various lags on the local consumer price index were tried as measures of price expectations in the labour market, and a time trend was tried as a proxy for technological advance. The time trend was no help. Ontario wage changes were more closely related to current changes in the consumer price index, whereas a one quarter lag seemed to fit Alberta best, and a two quarter lag fitted Newfoundland best (Table 4-13). That lag structure would fit with the common perception that Ontario is at the centre of the economy where leadership is exercised, that Alberta follows closely behind, and that Newfoundland receives new information last. (The Council's individual productivity interviews concerning 450 individual business establishments in 9 industreis suggested such lags between Ontario and Newfoundland, Economic Council 1980).

As one would expect (given the poor results of the preceeding regressions), these price expectations-augumented wage adjustment regressions are not satisfactory. The help wanted index always has the right sign, and the price expectations variables are all significant, but the effects of the unemployment rates were insignificant (and perverse).

## 6. Wage Parity, Price Expectations Augmented Wage Adjustment

The final step is to incorporate the effect of wage parity adjustment into the standard wage adjustment mechanism. The second columns of results for each province in Table 4-13 contain the synthesis of all the adjustment mechanisms so far. These regressions hypothesize that the rate of wage adjustment is simulataneously affected by the relative availability of jobs as measured by the help wanted index, the relative abundance of available workers as measured by the unemployment rate, the effect of price expectations as measured by recent changes in the consumer price index, and the desire to emulate current wage changes in Ontario. While the regressions are generally very poor, they are generally supportive of this theoretical synthesis, as is discussed in the 'Conclusions' section of this chapter, below.

## Table 4-13
## Price Expectations Augumented Phillips Curve Wage Adjustment,[1]

| | Newfoundland | | Ontario | Alberta | | |
|---|---|---|---|---|---|---|
| Constant | -0.08 ns[2] | 0.01 ns | -0.01 ns[2] | -0.004 ns[2] | 0.003 ns[3] | |
| Help wanted index (V) | 0.0003 ns | 0.00002 ns | 0.0001 ns | 0.0002 ns | -0.00004 ns | |
| Unemployment rate (U) | 0.002 ns | -0.0009 ns | 0.001 ns | 0.0004 ns | -0.00060 ns | |
| CPI | | | 0.57 | | | |
| CPI (-1) | | | | 0.61 | 0.43 | 0.38[3] |
| CPI (-2) | 1.64 | 0.32 ns | | | | |
| CPI (-3) | | 0.27 ns | | | | |
| Change in Ontario Wage | | 0.53 ns | | | 0.87 | 0.80 |
| Adjusted $R^2$ | 0.06 | 0.11 | 0.16 | 0.29 | .60 | 0.61 |
| Durbin-Watson statistic | 2.63 | 2.47 | 2.10 | 2.58 | 2.93 | 2.87 |
| F-statistic | 1.70 | 2.69 | 3.0 | 5.15 | 20.06 | 79.48 |

Source: Ordinary least squares regressions on CANSIM data. The sample period for the second Newfoundland regression is generally 1967.1 - 1984.4 and should have been used for all the regressions. The different sample periods were not intentional. These regressions were the only ones available at the time of drafting the report. Doing these poorly fitting regressions over again for somewhat longer time periods is unlikely to improve them.

1. The dependent variable is the quarterly rate of change in average weekly earnings.
2. Sample period is 1977.1 - 1984.4
3. The last two Alberta regressions are for 1972.1 - 1984.4.

## Conclusions

• Parity wage adjustment with Ontario is the strongest single hypothesis for wage determination in Alberta and Newfoundland (Table 4-10, 4-11 and 1-13). The introduction of the current Ontario wage change as an explanatory variable greatly improves the regressions for wage determination in both Newfoundland and Alberta. Taken in isolation, the hypothesis of parity in wage levels and the hypothesis of parity in wage changes are both statistically significant. Taken in simultaneous combination with all the other wage hypotheses (Table 4-13) parity in wage changes remains significant for Alberta and it nearly doubles the explanatory power of the Newfoundland regression, even though it fails to achieve statistical significance in the presence of all the other variables. Other things equal, it seems that a one per cent increase in average weekly earnings in Ontario will translate into at least a 0.5 percent increase in average weekly earnings in Newfoundland and Alberta.

• The second strongest factor affecting wage adjustment is the rate of inflation in consumer prices. Whereas the demonstration effect of wage changes seems to be very quick (less than three months) the effect of an increase in the general price level takes about three months to make its impact in Alberta, about six months or more in Newfoundland. A one per cent increase in the level of consumer prices seems to induce at least a 0.3 per cent increase in provincial average hourly earnings within six to nine months.

• The combined effects of emulating Ontario's wage increases and catching up to inflation are so large as to account for virtually all of the adjustment in average weekly earnings in both Newfoundland and Alberta. These two factors alone account for over 60 per cent of the variation in quarterly wage changes in Alberta (Table 4-13)

• Nevertheless, there is weak evidence that wage adjustments are moderated by higher unemployment and accelerated by higher job vacancies--but the effects are small. (Table 4-13). Regressions involving the unemployment rates and help wanted indexes alone (not shown) are not very satisfactory, but they suggest that Newfoundland wages are somewhat flexible upward (significantly responsive to the Atlantic region help wanted index) and that Alberta wages are flexible downward (significantly responsive to the province's unemployment rate).

• We have yet to find any statistical evidence to indicate that Newfoundland wages have much downward flexibility. Rather, the evidence suggests that Newfoundland wage rates have risen to equal or exceed national levels--in the face of massive unemployment--in those larger enterprises where Statistics Canada collects data on average weekly earnings and average hourly earnings in manufacturing. The Economic Council's work attitude survey found that, no matter what other variables were introduced into the regressions, Newfoundlanders remained statistically significantly less willing to take wage cuts to get jobs than was true of a random sample of Ontario workers.

• The single important moderating wage influence of which the author is aware, is the landmark labour agreement recently achieved between Fishery Products International and the Fisherman's Union (Chapter 6). It does not yet appear in the statistics. This four year agreement involves wage increases that are less than the rate of inflation following on the heels of two years in which there were no wage increases. The agreement arises from the ashes of bankrupcy of virtually the entire Newfoundland fish processing industry--the single largest remaining footloose manufacturing industry which could conceivably migrate out of the province if wage rates exceed productivity by too wide a margin. Although, it is too early to tell, some industry sources claim that this new agreement and some of the painful restructuring that has come with it, has been made possible by a fundamental change in the attitudes and understanding of the workers and management in the industry. It does not result from political intervention.

- In contrast to Newfoundland, the Alberta labour market retains much more economic responsiveness. Regressions demonstrate that wage adjustments are much more responsive to the presence of unemployment. Although relative wages clearly increased during the "energy decade" in Alberta, they are now clearly declining.

- Both the Ontario and Alberta labour markets seem to be more efficient at matching people and jobs than is true for Canada as a whole (Table 4.9). Common sense suggests that the Newfoundland labour market must have a difficult time mating workers scattered around 6000 miles of coast with the small number of jobs that might be created in various centres. Indeed, statistical regressions cannot even manifest a "people and jobs matching mechanism for Newfoundland (Table 4.9). Political forces that steadfastly fight against the urbanizing economic forces that would unite the labour market in Newfoundland may not be very constructive either for the economy of the province or of the nation.

- The fact that there seem to be so many discouraged workers in Newfoundland probably accounts for the weak showing of the Newfoundland unemployment rate in almost all regressions. As it is currently defined by Statistics Canada, the unemployment rate in Newfoundland is probably not a very accurate measure of the true extent of joblessness. The problem comes from defining 'unemployment' as a state of active job search; in certain rural areas of Newfoundland, everybody knows that, for persons who cannot face the risk of migrating (and losing their access to Extended Benefits and Fishermen's Unemployment Insurance, for example), there is no point in actively searching for a job during certain seasons.

- In spite of the counterproductive migration incentives in income maintenance policy, the labour supply in each province is significantly related to the extent of unemployment in other provinces to which its workers might migrate, or from which past migrants might return. Migration matters. It is responsive to economic variables.

- Also, current back-migration seems to be important in all regions, and it seems to be quick, occurring within the same quarter in which the initial migration took place. A one per cent increast in current in-migration to Alberta or Ontario is associated with a 0.7 per cent increase in out-migration (probably back-migration) within the same three month period. But a one per cent in-migration to Newfoundland will be associated with only a 0.18 per cent increase in out-migration. It looks like a lot of the in-migration to Newfoundland is made up of Newfoundlanders coming home to stay. By contrast, in-migration to Ontario or Alberta looks like seekers of fortune--about 70 per cent of whom either leave or are driven out again within a matter of weeks.

- Many young Newfoundlanders migrate to other provinces, at least for a time. A one per cent increase in births 16 years ago in Newfoundland is associated with a 0.67 per cent increase in out-migration, other things constant.

- A one per cent increase in Ontario employment will cause a very large 3.4 per cent increase in Newfoundland out-migration.

- Evidence suggests that 75 to 89 percent of Alberta's migrants are working age people whose economic behaviour is strongly influenced by economic opportunities. It seems to be predominantly young singles and married couples who are entering and leaving Alberta. By contrast, over half of the in-migrants to Newfoundland appear to be children, although working age people are probably in the majority of Newfoundland's out-migrants. Ontario appears to be the recipient of predominantly working age people through in-migration, but most of its out-migrants seem to be children. Evidently the primary out-migrants from Ontario must be mobile breadwinners who take a wife and several children with them.

- Economic adjustment seems to come much more through job creation and migration than through price adjustment. The participation rate, the supply of labour, and interregional migration are all much more strongly responsive to employment opportunities than to wage and price adjustments. T-statistics associated with employment and unemployment variables are often higher by an order of magnitude than is true for the significance of statistics related to price and wage factors.

- In all three provinces, a one percent increase in employment will induce a substantive increase in the size of the labour force--about a 0.7 percent increase in Newfoundland and somewhat smaller percentage increases in Ontario and Alberta. This effect is so strong in Newfoundland that job creation will have almost no effect on the province's measured level of unemployment. In Ontario, by comparison, you have to create two jobs to reduce unemployment by one person; but that is still a ten times stronger reduction in measured unemployment than the same policy could achieve in Newfoundland.

- Whereas Newfoundland still seems to have a normal upward sloping supply curve for labour, there is some doubt about the slope of the labour supply curve in both Ontario and Alberta. Some of the regressions suggest that if wages go up, people will work less; if the cost of living goes up, they will go back to work. This does not necessarily mean that the regressions are totally wrong. They could be suggesting that Ontario and Alberta have entered, or are on the verge of entering, a backward-bending portion of the labour supply curve where further wage increases will actually reduce labour force participation.

- The demands for labour are both price and income inelastic in all three provinces. A one per cent increase in Newfoundland's wage may reduce the quantity of labour demanded by 0.2 per cent or less. The Alberta economy, and to a lesser extent the Newfoundland economy, are more export-oriented than Ontario. For Ontario, a one per cent increase in Canadian GDP apparently increases the level of Ontario employment by 0.65 per cent whereas a one per cent increase in exports apparently raises Ontario employment by only 0.07 per cent. A drop in the Ontario wage will increase the quantity of labour demanded by only 0.16 to 0.19 per cent.

- The labour market matching mechanism is more efficient in Alberta and Ontario than it is in Canada as a whole. There is no a statistically significant people and jobs matching mechanism for Newfoundland.

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## Notes:

1. Disposable income by province was available on an annual basis, but not a quarterly basis in the author's databank; hence retail sales were tried in the quarterly regressions in place of disposable income.

# 6

# THE NEWFOUNDLAND FISHERY*

"Fishing isn't just another job.
That's why UI pays seasonal and year-round benefits.
Here's what you do to qualify."

...Cover of Unemployment Insurance Brochure

There are still too many fishermen chasing too few fish. But some people seem to have stopped worrying about the idea that the fishery could be managed efficiently so as to produce millions of dollars of economic rent every year if it were operated at its optimum economic yield (Figure 6-2 and Appendix F). Objective 2 in the 1982 Report of the Atlantic Fisheries Task Force headed by Michael Kirby (1982 p vii) states

**"Employment in the Atlantic fishing industry should be maximized subject to the constraint that those employed receive a reasonable income as a result of fishery-related activities, *including fishery-related income transfer payments*." [emphasis added]**

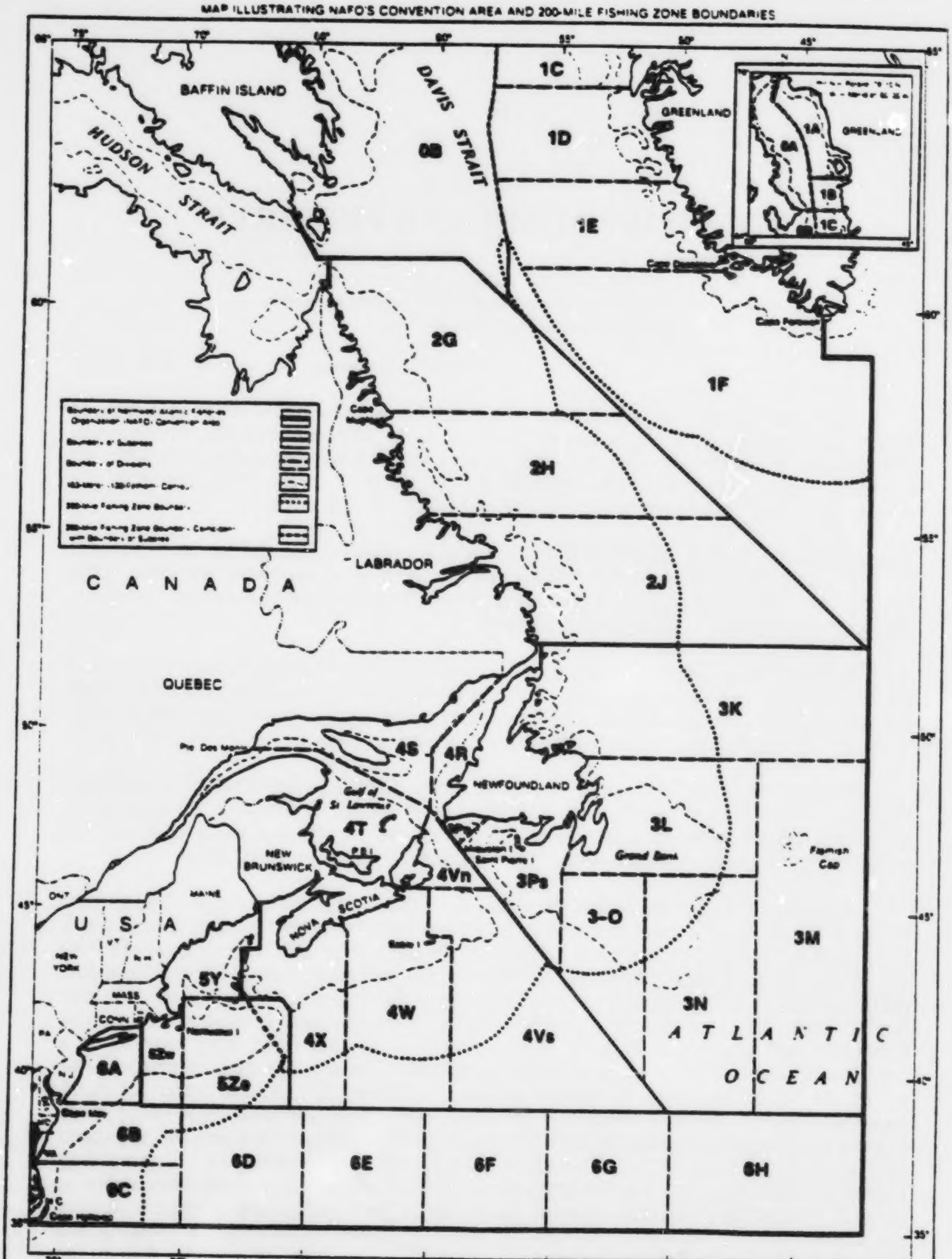
Now the concern, as expressed above, is really about how to use the fishery as a vehicle for dispensing politically acceptable "jobs" and social security payments by another name. By making fishery-related income transfer payments arbitrarily large, it is possible to make the level of "employment" in the fishery arbitrarily large as well.

But the marginal productivity of labour in the fishery is not zero; it is negative. Whereas adding extra fishermen cannot increase the stock of fish available for harvest, the additional vessels, gear, fuel and other inputs they use constitute a waste of economic resources--to say nothing of the waste of the marginal fishermen's own labour.

One must interpret the recent restructuring of the Fishery with caution. The current author is optimistic that the restructuring can be successful (see below). But there is a risk that, by the creation of the crown corporation, Fishery Products International (FPI) to absorb the bankrupt private fishing companies, the federal government may have lost political control of the payments it must make into this industry. Whereas the previous federal payments were largely made by way of Unemployment Insurance transfers to fishermen and fish plant workers, there is now a risk that there may have to be a continuous stream of injections of "new equity" into Fishery Products International to cover the losses it could be forced to incur to meet the income needs of rural Newfoundlanders. Lack of alternative economic opportunities in rural areas could invite insurmountable political pressure on FPI to maintain uneconomic fish plants and to expand the implicit program of job-sharing in fish plants for the purpose of generating Unemployment Insurance benefits for rural Newfoundlanders who have no other means of earning a "reasonable" income. Continuous losses by Fishery Products International, plus the unemployment insurance payments it could generate, could create a growing and uncontrollable burden for the Federal Government. And it could profoundly deepen the financial dependency of all parts of rural Newfoundland.

# MAP 6-1

MAP ILLUSTRATING NAFO'S CONVENTION AREA AND 200-MILE FISHING ZONE BOUNDARIES



BAFFIN ISLAND
HUDSON STRAIT
DAVIS STRAIT
GREENLAND
0B
1A
0A
1B
1C
1D
1E
1F
2G
2H
2J
3K
3L
3M
3N
3-O
3Ps
4R
4S
4T
4Vn
4Vs
4W
4X
5Y
5Ze
5Zw
6A
6B
6C
6D
6E
6F
6G
6H
CANADA
LABRADOR
QUEBEC
NEWFOUNDLAND
Gulf of St Lawrence
P.E.I.
NEW BRUNSWICK
NOVA SCOTIA
MAINE
ONT
U S A
NEW YORK
MASS
CONN
Grand Bank
Flemish Cap
ATLANTIC OCEAN
Boundary of Northwest Atlantic Fisheries Organization (NAFO) Convention Area
Boundary of Subarea
Boundary of Divisions
183-Metre (100-Fathom) Contour
200-Mile Fishing Zone Boundary
200-Mile Fishing Zone Boundary Coincident with Boundary of Subarea
75°
70°
65°
60°
55°
50°
45°
40°
35°

FIGURE 6-1

INSHORE-OFFSHORE FISHING TRADEOFF

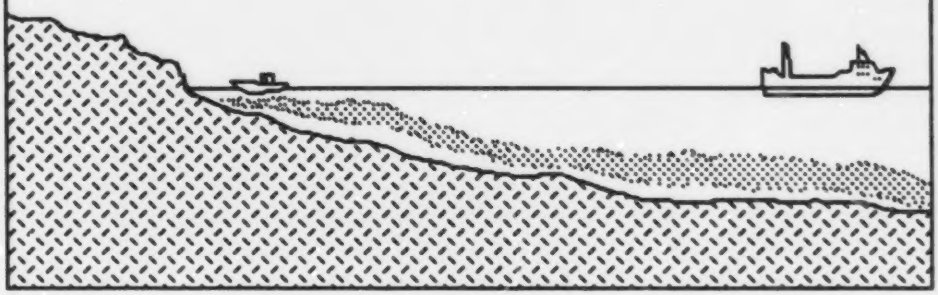
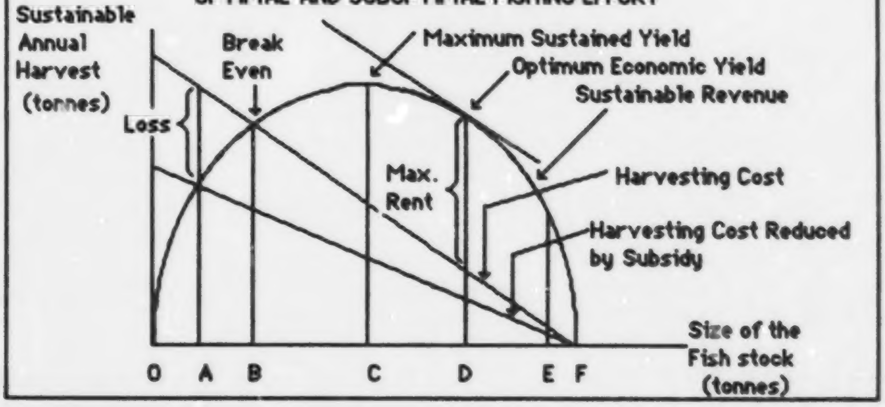


FIGURE 6-2

OPTIMAL AND SUBOPTIMAL FISHING EFFORT



In an unfished stable stock of fish living in a stable environment, the biomass added by growth of individual fish and by recruitment of new fish is balanced by the biomass lost through natural mortality. There is no net growth to be harvested (and no harvesting cost) if the biomass is to remain at this maximum size F. As fishing effort increases (and the annual harvesting cost rises) some of the biomass is lost through fishing. As the biomass declines from F toward C, there is progressively larger annual net growth because the remaining stock of fish can increase its growth and recruitment and decrease its natural mortality as a result of lower numbers of fish competing for the same food supply. As the size of the stock increases from zero, annual growth increases to a maximum stained yield at C because there are progressively larger numbers of fish to grow and reproduce. Any biomass of size 0 through F has a natural rate of annual growth which can be harvested on a sustainable basis without changing the size of the biomass.

As annual fishing effort increases from zero, the equilibrium size of the stock falls from F until, at B, the annual cost of fishing just equals the annual revenue from fish caught. Adding subsidies for boats, gear and Fishermen's Unemployment Insurance encourages more fishing effort which reduces the size of the stock to A. Total costs now exceed revenues, implying negative economic rent. A provate property fishery would maximize economic rent at a larger stock D and use less fishing effort--perhaps much of it using offshore trawlers year round with a much reduced inshore fishing effort in summer.

To ensure that the offshore cod stock is large enough to permit most of the harvesting to be done during the summer migration inshore by small fishermen with stationary gear might require a larger stock E.

The fact that the operations of this corporation constitute the dominating economic activity in most of the rural corners of Newfoundland, and that it intimately and profoundly influences the personal incomes of largest single block of voters in every constituency on the island means that it may ultimately be politically impossible to run Fishery Products International as a business. There is, however, one mechanism that could protect Fishery Products International from this pressure--a legitimate, universal income maintenance scheme that is not tied to the fishery. The MacDonald Commission's call for a Universal Income Security Program (UISP) to guarantee all Canadians $3825 per adult would, if implemented, be successful at removing this economic pressure on the fishery (MacDonald 1985).

## Optimistic Signs

During interviews with provincial officials and the President and Chief Executive Officer of Fishery Products International in October 1985, the author became convinced that the current Board and Senior Management of the corporation have every intention of "running FPI as a business", that upon the receipt of an another $105 million in October, (raising the total public and bank contributions to $280 million in the two years since the company's formulation) they intend to run the corporation at a profit, and that they do not intend to allow the operation of FPI to be influenced by the need to finance the income maintenance system currently in use in rural Newfoundland. The company's business plan (October 1985) approved by the Board and both governments, contains a commitment to a profit in 1986, and a commitment to divest the corporation of 8 of its own fish plants, and 7 more fish plants which it leases from the province or local communities. A decision on the future of any unsold plants will be made in the 1988 Business Plan (probably an election year for both the provincial and federal governments).

During a subsequent separate interview with the President of the Fishermen's Union, the author became convinced that the company and the union are mutually agreed on the need to operate FPI on a commercial basis if the unionized fishermen involved are to maximize the incomes they can obtain from the company. A dramatic improvement in company-union relations is evident and there is evidence of a number of actions taken by both sides that reinforces the mutual commitment to the operation of an efficient commercial corporation based on eight deepsea trawler plants, one deepsea scallop operation, six inshore plants, three secondary processing plants, and one refit centre. Whether both sides can continue their present course depends crucially, in the author's opinion, upon government action to lift the burden of Newfoundland's rural income maintenance problem from their shoulders.

# UPDATING HISTORY

In 1978, the Newfoundland Department of Fisheries released two documents which explicitly favoured allocating--by 1985--eighty-five per cent of the Northern Cod Stock to the inshore fishery to support the present rural structure of the province and to minimize the access of other provinces to the fish.[1] In *Setting a Course*, the authors proposed reducing the fleet by one-fifth so that a smaller number of fishermen could make a living without subsidies. Given an expected 77 per cent increase in the cod harvest by 1985 (as fish stocks recovered from their seriously depleted state on January 1st, 1977 when Canadian Extended Fisheries Jurisdiction was introduced), they estimated that nearly 5,700 fishermen could take the entire near-shore harvest in 1985 and still receive a "modest" income of $7,500 per capita, expressed in 1977 dollars. This implied a 69 per cent reduction from the 21,000 fishermen[2] who held licenses in 1977.

By contrast, the province's subsequent *White Paper on Strategies and Programs for Fisheries Development to 1985* called for only a 4 per cent reduction in the number of fishermen to 17,500 for the near-shore (12,000 of whom would apparently be redundant). It was implicit that the division of the same number of fish among nearly three times the number of fishermen would make it impossible for these fishermen to make even the "modest" incomes forseen in *Setting a Course*.

Politically, it would be difficult to limit access to the fishery to 5,700 fishermen, for that would cause almost 12,000 others to lose not only their fishing incomes, but to also lose the opportunity to qualify for seasonal unemployment insurance benefits. In 1979 there were over 10,000 unemployment insurance claims by fishermen, averaging $2,380 per claim. Implicitly the White Paper was calling, not only for the dissipation of the economic rent in the fishery, but to enforce negative economic rents, in the sense that all the capital and operating expenses incurred by the 12,000 redundant fishermen would be unnecessarily expended in the interests of job sharing or disguising the extent of unemployment that actually existed.

What has happened since these two government documents were released? Things got worse (ECC Table 6-2). The number of registered fishermen (including some 1200 offshore fishermen) increased from 20,244 in 1977 to more than 35,000 in 1980.[3] By 1983, there were still some 28,000 registered fishermen--almost 40 per cent more than in 1977 when Extended Fisheries Jurisdiction was introduced. Meanwhile, the value of fish landings nearly doubled in nominal terms--but only 11 per cent in terms of real purchasing power, when the value of landings are deflated by the consumer price index for St. John's. Hence the real value of fish landings per registered fisherman declined 20 per cent between 1977 and 1983 (from $2,549 to $2,039 measured in 1971 constant dollars).

Meanwhile the number of fishermen's unemployment insurance claims roughly doubled from 6,540 in 1977 to 12,719 in 1983 while the real value of the average fisherman's claim rose 11 per cent (from $ 1,219 to $1,412 in 1971 constant dollars). The average number of insured weeks worked fell to the lowest levels in more than a decade, the proportion of fishermen who fished more than 19 weeks fell to only two-thirds of what it was in 1977, while the number of weeks of paid benefits under unemployment insurance mushroomed to 240 percent of what it was in 1977. At $52.5 million, the 1983 value of fishermen's unemployment insurance benefits were 31 per cent as large as the gross value of fish landings, whereas they had been only 15 per cent as as large as the value of fish landings in 1977.[4]

## ECC Table 6-2
## Selected Fishery Statistics, Newfoundland 1972-1984

| | | | Unemployment Insurance Benefits to Fishermen | | | | |
|---|---|---|---|---|---|---|---|
| Year | Number of fishermen[1] | Value of fish landings | Number of Claims Allowed | Average number of insured weeks worked | Proportion of beneficiaries with over 19 insured weeks of work | Value of Benefits | No. of weeks of paid benefits |
| | | $'000 | | | % | $'000 | |
| 1955 | 16,000 | | | | | | |
| 1956 | 14,956 | | | | | | |
| 1957 | 16,469 | | | | | | |
| 1958 | 18,364 | | | | | | |
| 1959 | 18,430 | | | | | | |
| 1960 | 18,291 | | | | | | |
| 1961 | 18,756 | | | | | | |
| 1962 | 19,817 | | | | | | |
| 1963 | 21,407 | | | | | | |
| 1964 | 22,615 | | | | | | |
| 1965 | 21,701 | | | | | | |
| 1966 | 20,286 | | | | | | |
| 1967 | 19,814 | | | | | | |
| 1968 | 19,355 | | | | | | |
| 1969 | 17,770 | | | | | | |
| 1970 | 17,765 | | | | | | |
| 1971 | 15,961 | | | | | | |
| 1972 | 14,452 | 36,515 | 5,936 | 17.2 | 34 | 4,470 | 84,102 |
| 1973 | 15,313 | 47,886 | 5,152 | 17.6 | 36 | 4,638 | 67,462 |
| 1974 | 12,793 | 42,903 | 4,541 | 16.4 | 29 | 5,025 | 65,516 |
| 1975 | 15,000 | 45,783 | 4,248 | 16.9 | 33 | 4,421 | 53,657 |
| 1976 | 18,400 | 64,715 | 6,237 | 16.5 | 32 | 6,464 | 70,094 |
| 1977 | 20,244 | 85,494 | 6,540 | 15.7 | 23 | 13,208 | 129,809 |
| 1978 | 26.484 | 118,364 | 8,331 | 15.8 | 22 | 18,948 | 159,867 |
| 1979 | 32,352 | 159,258 | 10,342 | 16.8 | 31 | 24,609 | 206,786 |
| 1980 | 35,080 | 161,286 | 11,642 | 16.4 | 26 | 33,039 | 254,495 |
| 1981 | 28,587 | 170,765 | 12,289 | 15.1 | 18 | 36,973 | 266,323 |
| 1982 | 27,379 | 176,287 | 13,615 | 14.3 | 18 | 42,033 | 283,066 |
| 1983 | 28,074 | 167,419 | 12,719 | 13.9 | 15 | 52,536 | 310,541 |

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1. Data from 1974 represent registered individuals and not enumerated fishermen as in previous years. Some fishermen have more than one fishing licence. Whereas these data report 28,587 registrations for 1981, the Kirby report counts 23,006 fishermen of which 12,807 were full-time and 10,199 were part-time.

Source: Department of Fisheries and Oceans, Economic Service Branch, Newfoundland Region, for number of fishermen; Statistics Canada, *Monthly Review of Candian Fisheries Statistics*, Cat. 24-002, for value of fish landings; Employment and Immigration Canada, for claims allowed, average number of insured weeks worked, and beneficiaries with over 19 insured weeks worked; Statistic Canada, *Statistical Report on the Operation of the Unemployment Insurance Act*, Cat. 73-001, for value of benefits and benefit weeks paid; and Director of Finance, Fisheries Loan Board, for loans granted and value.

Attempts have been made to control entry to the fishery, but with limited results. The Department of Fisheries and Oceans has a limit on the number of ground fish species licences which are separate from the personal fishing licences. Persons who have no ground fishery licences may not fish for groundfish by themselves, but they may act as crew members for persons who do have groundfish licences. This system controls access to the groundfishery, but it does not impose limits on the number of persons who may qualify for Fishermen's Unemployment Insurance. The Department of Fisheries and Oceans has no mandate to manage the income maintenance system of rural Newfoundland; its mandate is to control fishing activity, not to provide an income of last resort to the unemployed. Yet, failure of governments to deal directly with the income maintenance problem must surely put the Department of Fisheries and Oceans in a difficult position with respect to licencing fishermen.

Beginning in 1980, the Department began distinguishing personal fishing licences to "full time fishermen" from those granted to "part time fishermen". (Personal fishing licences are now called "fishermen's registrations" to distinguish them from "species licences".) "Full time fishermen" must fish the normal fishing season in their localities and must not have employment outside the fishery during this period. "Part-time fishermen" either do not fish the required period of time for their areas, or if they do, they also have outside employment during this period. The purpose was to identify those most dependent on the fishery for their livelihood to ensure that any benefits from the fishery would accrue to them. For example, new species licences and the transfer of existing species licences became available only to full-time fishermen. Part-time fishermen are permitted to maintain the licences they presently hold but are not permitted to obtain additional licences. While the Economic Council (1980) saw no need to distinguish "full time" fishermen from "part time" fishermen, the move to limit the number of species licences and to make them transferable is in keeping with the Council's recommendation number 11.

Both full time and part time fishermen are eligible to apply for Fishermen's Unemployment Insurance, but the part time fishermen use the Fishermen's UI as a second-best solution. If they can get enough work outside the fishery to qualify for regular Unemployment Insurance, it is prefered because its benefit period lasts longer, and the wages earned on employment outside the fishery may give rise to larger U. I. benefits than this worker could get based on his income in fishing. Since 1980 no personal fishing licences have been issued unless a fisherman could verify employment as a crew member. Although the presence of remarkably high unemployment rates in rural Newfoundland would suggest that there must be great pressure for unemployed people to use the crew member route to gain access of last resort to unemployment insurance benefits, a senior official of DFO stresses that "there is no link between part-time fishing licences and eligibility for the fishermen's seasonal benefits."

Kirby (1982 p 61) notes that 83 per cent of full time fishermen and 52 per cent of part-time fishermen on the Canadian East Coast claimed Unemployment Insurance benefits in 1981. (It was higher in Newfoundland.) In northeast Newfoundland and Labrador, where earned incomes are lowest, UI payments made up 32 per cent of average total net incomes for full-time fishermen.

A comprehensive 1981 income survey of 1300 licenced fishermen demonstrated that the average Atlantic Coast full time fisherman spends 15 weeks on Unemployment Insurance (receiving $2,466 in benefits), 23.1 weeks fishing and 2.5 weeks working outside the fishery (earning $927). The average part-time fisherman spends 18 weeks on Unemployment Insurance (receiving $1,483 in benefits), 11.8 weeks fishing and 15.2 weeks of paid work in some other occupation earning $6,203 --often as a school teacher, fish plant worker or construction worker--(Kirby 1982). About 96 per cent of the full time licence holders actually used their fishing licences. The average number of part-time fishermen who used their licences ranged from 55 per cent in Northeastern Newfoundland and Labrador to 80 per cent on the West Coast of Newfoundland.

Except on the south coast, part-time fishermen in Newfoundland fish barely more than 10 weeks per year on average--just barely long enough to qualify for Unemployment Insurance (New Table 6-1). Full-time fishermen averaged 17.4 weeks of fishing in Northeastern Newfoundland and Labrador, 21.99 weeks in Eastern Newfoundland, 28 weeks in southern Newfoundland, and 19.21 weeks in the West. Adding up the average number of weeks fished and the average weeks of paid employment outside the fishery demonstrates that both full-time and part-time fishermen in Newfoundland have only 20 to 30 weeks of paid employment per year.

The average incomes from fishing are extremely small, ranging from $3000 in Labrador and Northeastern Newfoundland to almost $10,000 on the Southern Coast. Unemployment Insurance benefits are 71 per cent as large as the net income from fishing in Labrador and Northeastern Newfoundland. Household income statistics show that the other family members are also engaged in fishing, that they earn some income outside of fishing, and that they too receive a certain amount of unemployment insurance. Unemployment insurance payments are more than 20 per cent as large as earned income from all sources in fishermen's families in Northern and Western Newfoundland. At the same time, a number of these families were receiving welfare in 1981 because Social Assistance payments were about 10 per cent as large as earned income, on average. While the Government of Newfoundland and many Newfoundlanders insist that fishing is a desirable way of life, there can be little doubt that a very large number of the fishermen are living in poverty, and that the unemployment insurance payments are more than half as large as the net income from fishing for the majority of these fishermen.

Kirby estimates that 83,000 persons (or almost 15 per cent of the population of Newfoundland) live in fishermen's households. This demonstrates the tremendous importantance of the fishery and Fishermen's Unemployment Insurance in the politics of Newfoundland. When one adds the additional households that involve fish plant workers and outport families who depend indirectly on the fishery, the political significance of the fishery and Unemployment Insurance becomes much greater still.

In response to the Kirby Report, Fishermen's Unemployment Insurance was liberalized on June 5th, 1983. The are now two seasons (to accomodate fishermen whose season did not fit the original program). Fishermen's benefits are now based on the ten best weeks for those who fish at least 15 weeks. In 1983 and 1984 statistics indicate Newfoundland fishermen promptly increased their weeks of fishing to take advantage of the new rule. Also, fishermen may now build boats during the off season without going off U.I.

Preliminary data for 1984 (New Table 6-2) show a worsening situation where unemployment insurance payments per fisherman have nearly risen to the $3800 guaranteed annual income recommended per adult by the MacDonald Commission (1985). In Northeastern Newfoundland and Labrador, the situation has deteriorated to the point where the average full time fisherman receives more money from Fishermen's U.I. than he does from fishing!

## New Table 6-1
## Numbers of Full-Time and Part-Time Fishermen, Their Incomes and Weeks Worked, 1981

| | Labrador & Northeastern Newfoundland | Eastern Newfoundland | South Coast Newfoundland | West Coast Newfoundland | Total |
|---|---|---|---|---|---|
| Number of licenced fishermen | | | | | |
| Total | 7,037 | 7,439 | 3,296 | 5,234 | 23,006 |
| Full-time | 4,091 | 3,755 | 2,033 | 2,928 | 12,807 |
| Part-time | 2,946 | 3,684 | 1,263 | 2,306 | 10,199 |
| Average weeks fished | | | | | |
| All fishermen | 14.49 | 16.47 | 23.53 | 15.30 | |
| Full-time fishermen | 17.40 | 21.99 | 28.00 | 19.21 | |
| Part-time fishermen | 10.43 | 10.76 | 16.32 | 10.33 | |
| Average weeks of other paid employment | | | | | |
| Full-time fishermen | 3.38 | 3.69 | 2.30 | 1.65 | |
| Part-time fishermen | 15.09 | 15.26 | 14.85 | 17.94 | |
| Fisherman's AverageIncomes, All Respondents | | | | | |
| Fisherman's Own Income | | | | | |
| Net fishing income | $3,028 | $4,693 | $9,772 | $4,224 | |
| Non-fishing earned income | $5,818 | $6,251 | $5,767 | $6,262 | |
| UI income | $2,144 | $2,073 | $1,402 | $2,229 | |
| Fisherman's Household Income | | | | | |
| From fishing | $3,659 | $5,376 | $11,270 | $5,941 | |
| Non-fishing income | $10,956 | $12,362 | $10,542 | $12,369 | |
| UI income | $3,017 | $2,847 | $1,931 | $4,001 | |
| Fisherman's U.I. as a percent of his fishing income | 71% | 44% | 14% | 53% | |
| U. I. as a percent of fisherman's household earned income | 21% | 16% | 9% | 22% | |
| Social Assistance as a percent of household earned income | 10% | 10% | 8% | 10% | |

Source: Data from Department of Fisheries and Oceans. Based on 1300 sample survey of fishermen.

## New Table 6-2
## Summary of Average Incomes and Weeks Worked by Region for Full-Time and Part-Time Fishermen Combined, 1984[1]

| Income Source | N.E. Nfld and Labrador | Southeast Newfoundland | South Newfoundland | West Newfoundland | 1984 Total Nfld. | 1981 Total Nfld. |
|---|---|---|---|---|---|---|
| | ......................................current dollars per respondent...................................... | | | | | |
| Gross Fishing | 5 502 | 7 404 | 13 921 | 9 498 | 8 463 | 8 173 |
| Net Fishing | 3 011 | 4 607 | 9 849 | 5 425 | 5 266 | 4 803 |
| Other Employment | 1 358 | 697 | 1 000 | 882 | 1 013 | 1 118 |
| Transfer Payments (excluding U.I.) | 375 | 800 | 489 | 235 | 485 | 695 |
| Regular U.I. | 415 | 960 | 1 069 | 582 | 725 | 2 033* |
| Fishermen's U.I. | 3 058 | 2 912 | 1 816 | 2 467 | 2 658 | |
| Other Income | 63 | 318 | 307 | 28 | 173 | |
| Total Non-Fishing Income | 5 258 | 5 985 | 4 700 | 4 208 | 5 132 | 5 966 |
| Total Net Income | 8 269 | 10 592 | 14 549 | 9 633 | 10 398 | 10 769 |
| Net Fishing as % of Total | 36% | 43% | 68% | 56% | 51% | 45% |
| UI as & of Total | 42% | 37% | 20% | 32% | 33% | 19% |
| Weeks Fished | 14.1 wks | 14.6 wks | 24.4 wks | 15.1 wks | 16.4 wks | 16.6 |
| Full Time and Part Time Comparison | | | | | | |
| Net Fishing Income | | | | | | |
| Full Time | 3 575 | 5 911 | 12 291 | 7 670 | 6 820 | 6 679 |
| Part Time | 1 859 | 2 707 | 3 458 | 2 726 | 2 573 | 2 439 |
| U.I., fishermen's & regular | | | | | | |
| Full Time | 4 091 | 4 236 | 2 913 | 3 610 | 3 781 | 2 167 |
| Part Time | 2 250 | 3 350 | 2 812 | 2 376 | 2 704 | 1 306 |
| Total Net Income | | | | | | |
| Full Time | 9 189 | 11 439 | 16 252 | 11 905 | 11 809 | 10 656 |
| Part Time | 6 368 | 9 331 | 9 805 | 6 963 | 7 914 | 10 917 |
| U.I. as % of Total | | | | | | |
| Full Time | 45. % | 37. % | 18. % | 30. % | 32. % | 20. % |
| Part Time | 35. % | 36. % | 29. % | 34. % | 34. % | 12. % |
| Fishermen's U.I. Relative to Total Fishing Income | | | | | | |
| Full Time | 107. % | 67. % | 18. % | 44. % | 50. % | .. |
| Part Time | 81. % | 53. % | 23. % | 50. % | 53. % | .. |

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**Warning:** These data are are preliminary and must be used with caution. The general direction of income movements is probably reliable but the actual numbers may change as further analysis is undertaken. Please consult with the Department of Fisheries and Oceans for the most recent data available.

Source: 1984 Survey of Atlantic Fishermen, conducted in the spring of 1985. "Transfer payments" include social assistance, pension, and family allowance. "Other Income" includes rental and investment income as well as unidentified sources of income. "Total Non-Fishing Income" is the difference between "Total Net Income" from all sources and "Net Fishing Income". The components of income may not sum to the "Total Net Income" figure due to incomplete responses from some respondents. This problem will be rectified as the analysis proceeds.

* Includes Regular and Fishermen's U.I.

## Other Fishery Programs

The Economic Council was implicitly critical of government policy to provide subsidized loans (largely provincial) to the fishery. These cannot raise earned incomes in the overcrowded fishery because they cannot increase the amount of fish available to be caught. Subsidized loans act to encourage more people to stay in the fishery. The nominal value of loans made by the Fisheries Loan Board nearly doubled between 1977 and 1980-81 (ECC Table 6-2 Continued).

ECC Table 6-2 Continued
Selected Fishery Statistics, Newfoundland 1972-1984

Loans granted by the Fisheries Loan Board[2]

| Year | Number | Value | Loans under $50,000 | | | Bank Program (Loans over $50,000) | | |
|---|---|---|---|---|---|---|---|---|
| | | | Number | Value | Net Assistance[4] | Number | Value | Net Assistance[4] |
| | | $'000 | | $'000 | $'000 | | $'000 | $'000 |
| 1972 | 388 | 1,660 | | | | | | |
| 1973 | 442 | 2,774 | | | | | | |
| 1974 | 385 | 3,208 | | | | | | |
| 1975 | 408 | 5,492 | | | | | | |
| 1976 | 531 | 6,409 | | | | | | |
| 1977 | 818 | 9,240 | | | | | | |
| 1978 | 1,118 | 13,313 | | | | | | |
| 1979 | 1,028 | 21,188 | | | | | | |
| 1979[3] | 659 | 13,800[5] | 659 | 13,800 | 9,046 | - | - | - |
| 1980 | 716 | 23,239 | 671 | 11,583 | 8,724 | 45 | 11,656 | 7,957 |
| 1981 | 687 | 23,158 | 638 | 8,012 | 6,345 | 49 | 15,146 | 11,868 |
| 1982 | 635 | 11,887 | 621 | 7,280 | 5,852 | 14 | 4,607 | 3,129 |
| 1983 | 646 | 11,868 | 632 | 6,989 | 5,497 | 14 | 4,879 | 3,170 |

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2. Data are for fiscal year ending March 31st of the following year
3. New data for 1979-80 were obtained on a different basis from Karl Sullivan, Department of Fisheries and Oceans, St. John's, Newfoundland, ph 1-709-576-3712.
4. The difference consists of fishermen's equity, federal government bounty etc.
5. Sum of columns 5 and 8.

## The Offshore

The offshore fishery recieved 18 per cent of the total allowable catch (TAC) of the Northern Cod Stock in 1979 and 25 per cent in 1980. In 1978, this sector employed 1100 to 1200 persons annually, and was closely tied to 12 integrated processing plants which operated year round. These plants also received product from inshore fishermen so that they accounted for about 40 to 50 percent of the processed products.

The authors of *The White Paper* and *Setting A Course* expected the catch per trawler-day to increase 43 percent by 1985 as the stocks recovered; DFO data for otter trawlers in NAFO areas 2-4 indicate a 61% increase in tons of groundfish harvest per trawler day between 1978 and 1982. According to information available to it at the time, the Economic Council (1980) expected fifteen side trawlers and five old stern trawlers to be replaced with new stern trawlers; in addition, twenty-two new trawlers were to be phased in by 1985. Subsequent data show between 1978 and 1983 only 7 side trawlers left the fleet and the net increase in stern trawlers was only 8. It appears that the recovery in productivity per trawler day have been excellent (Appendix F), and that overentry in the trawler sector has been controlled, but that the total volume of cod available for harvest have not been up to expectations.

The offshore groundfish fleet, for licensing purposes, consists of vessels of 65 feet and longer. This fleet has been under limited entry control since 1973 when only those vessels with a documented past history in the fishery were permitted access. The number of active licences fluctuated somewhat between 1973 and 1979 as vessels were replaced and some "banked" licences activated, a banked licence being a privilege held in reserve. Prior to 1979 the number of valid licences (both active and banked ) was about 281. In 1979, licensing policy eliminated 54 of these licences, leaving the 227 licences issued today (166 greater than 100 feet and 61 between 65 and 100 feet).

## Processing

In expectation of larger catches as the fish stocks recovered under the new regime of Canadian Extended Fisheries Jurisdiction to the 200 mile limit, the processing capacity of the industry was expanded, sometimes with financial assistance from the Department of Regional Economic Expansion, but often with provincial support and loans from private banks. The number of (provincially licenced) plants in Newfoundland grew from 147 to 255 between 1977 and 1981 (Kirby p 31). Some of these plants are small and many operate only a few weeks per year. As a result the capital costs per pound of fish processed are higher than in Nova Scotia where the plants stay open for a longer period of time. This expansion helps explain why the industry got into severe financial difficulties.

## Marketing

In 1980 there was concern that markets would be difficult to obtain for Canadian fish because the American fish stocks were recovering, and Canada had limited access to the fish markets in the rest of the world, and the United States imposed high tariffs on processed fish imports from Canada. These fears were partly realized. Northeast United States groundfish and flounders in have not recovered whereas stocks under Canadian management have (Figures 6-3 and 6-4). Partially as a result of the appreciation of the American dollar, Canadian product made substantial inroads into the U.S. market--to such an extent that the Northeastern fishermen in the Unites States approached the International Trade Commission for increases in tariff protection (see below). Fishery Products International has undertaken a major marketing effort in the restructured fishery.

## POLICY CHANGES

Biologists are not able to quantify forecasts of fishing success inshore because the availability of cod inshore is influenced predominantly by seasonal environmental conditions. Even when the stock is large, the trap, net and small boat fisheries may not be able to harvest cod simply because the fish are distributed beyond the limited range of the boats and gear. On the other hand, it is conceivable that the greatest value may be generated from the fishery by concentrating most of the harvesting offshore and sustaining the cod stock at a level that would result in rather small numbers of cod migrating inshore each year.

Previous research has not demonstrated whether the resource is more economically harvested offshore or inshore. Economic Council research (Schrank, Tsoa and Roy 1981) suggested that the catch per dollar of effort in both fisheries might be similar. Lower labour costs in the offshore fishery are offset by its higher capital costs. If (contrary to fact) a constant proportion of the cod stock were to migrate inshore each year regardless of the size of the stock, and if both the inshore and offshore fisheries are equally efficient at harvesting them, then economic efficiency would not affected by allocating most of the fish catch to the inshore fishery. Such a policy would be a costless way to create jobs, provided the inshore fishery was organized so as to maintain the quality of its product. Given the unpredictability of cod migrations inshore, we cannot be sure that such a policy is costless.

Since the biological information is still incomplete, the Economic Council recommended that biological research into the fishery be stepped up--especially to provide more information about inshore/offshore trade-offs. DFO officials in Ottawa state that "increased research has been directed to the population structure of this resource to address the significance of any difference in the geographical distribution of sub-components [of the stock], and on the environmental factors that determine the distribution [of the stock]. At present, there is no means available to forecast the physical characteristics of the coastal waters and hence the finer scale availability of the cod. Oceanographic and biological studies are continuing." (author's private correspondence with DFO.)

To bring the numbers of fishermen under control, the Economic Council, as a matter of urgency, recommended strict control on the number of commercial fishing licences, that it charge a suitable fee for each licence, and that such a licence be made transferable. The Council conservatively suggested that the number of licences (by which it meant personal fishing licences) should not be increased beyond the 21,000 fishermen recommended in the Newfoundland *White Paper*. By making the licences transferable, the Council hoped that any persons who wanted to enter the fishery could do so by purchasing an existing licence so that entry would be possible without increasing the number of fishermen. Clearly, the federal government has allowed the number of registered fishermen to rise far beyond what even the *White Paper* , in all its political generosity, had advocated (ECC Table 6-2).

Having a fixed number of transferable licences would also have provided the federal government with a very neutral tool for reducing the number of the fishermen. It could have purchased some of the outstanding licences in the "open market", thereby letting some of the fishermen voluntarily leave the fishery on financial terms dictated by themselves: no fisherman would leave unless he judged the price offered for licences to be worth while. And such a move would not be irreversible for the individual fisherman; if he later changed his mind and wanted back into the fishery, he could come back by purchasing a licence on the "open market". Clearly the number and nature of licences has not proceeded exactly as the Economic Council had hoped, but the Department of Fisheries and Oceans has certainly been struggling, within the limitations of the political environment, to bring fishing effort under control, and with evident better results than shown in American waters (Figures 6-3 and 6-4.)

As pointed out above, DFO has required since 1975 that each fisherman have a personal fishing licence (PFL)--now called a "fisherman's registration". In addition, the fisherman must have a specific species licence (SSL) if he is to have the right to independently fish for that species. The personal fishing licence (fisherman's registration) is associated with the person; the specific species licence is issued to an individual or company, usually in respect of a named vessel. The personal fishing licences are not strictly limited in number and are not transferable. Most of the specific species licences are strictly limited in number (in all areas but the northeast coast) and are transferable from one vessel to another.

Since 1980 no additional personal fishing licences have been issued in Newfoundland--unless a fisherman could verify employment as a crew member. But, as long as the man can convince one of his fully licenced neighbours to make him a crew member, it seems that he may still obtain a personal fishing licence and participate in the groundfishery. Entry has been 'sort of limited' since 1980, but not in the clear-cut fashion recommended by the Economic Council. Given the political pressure to leave open the opportunity to fishermen's Unemployment Insurance as an income of last resort, it seems that DFO could not possibly provide a water-tight upper limit on the number of personal fishing licences without bringing a political backlash against itself. If government would take direct control of the income maintenance problem it would relieve DFO of a type of social welfare problem that it has no mandate to deal with. DFO has a mandate to manage a commercial fishery, not to manage general income security programs.

The system of specific species vessel licences has been gradually evolving since limited entry into the groundfish fishery was introduced in 1973 for vessels of 45 feet and longer, and for all vessels and all gear in 1980--with the exception of the northeast coast of Newfoundland. On the northeast coast (where incomes are lowest, fishing season shortest, and where Fishermen's Unemployment Insurance Benefits exceed the average net income from fishing) the present policy is that any full-time fisherman with a vessel of less than 35 feet in length can acquire a groundfish fixed gear licence. Between 1978 and 1981 the numbers of these northeast coast vessel licences for groundfish were 5047, 5515, 5506 and 5505. These licences are not transferable; new ones are issued without limit every year. For vessels of more than 35 feet, however, licences may only be transferred to full-time fishermen so categorized for the past 5 consecutive years.

For western Newfoundland, licences are transferable to full-time fishermen who have been crew members working for the present licence-holder for the past two years. In the lobster and scallop fisheries, a licence can be transferred to full-time fishermen so categorized for the past 5 consecutive years.

Whereas the number of personal fishing licences issued in Newfoundland has declined from about 35,000 in 1980 to about 28,000 in 1983, the number of specific species licences for groundfish issued to vessels is now 9,994. Although government has not bought back any groundfish licences, it did buy back some Newfoundland salmon licences from part-time fishermen in 1985.

Relative Abundance
of principal groundfish
and flounders

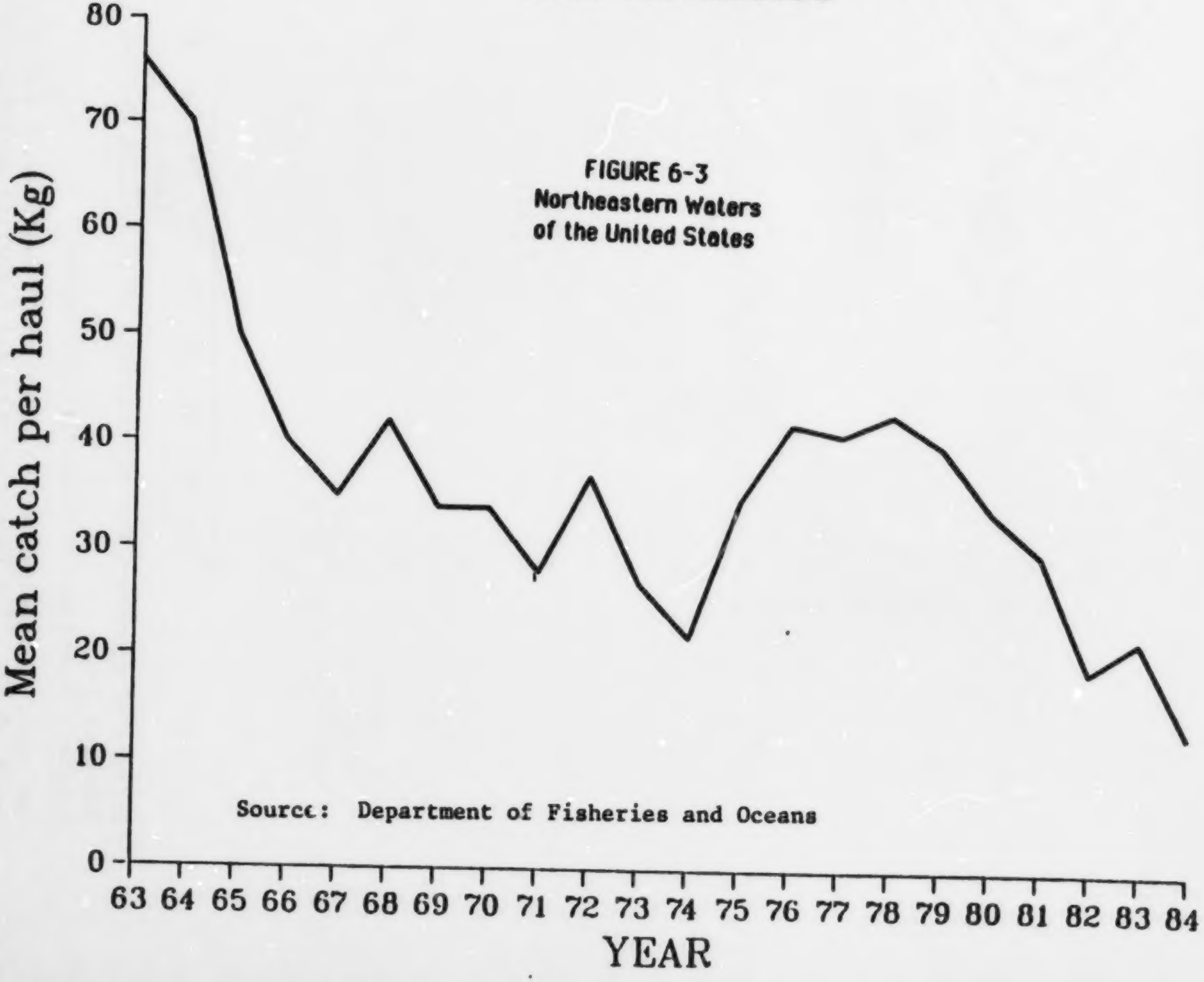
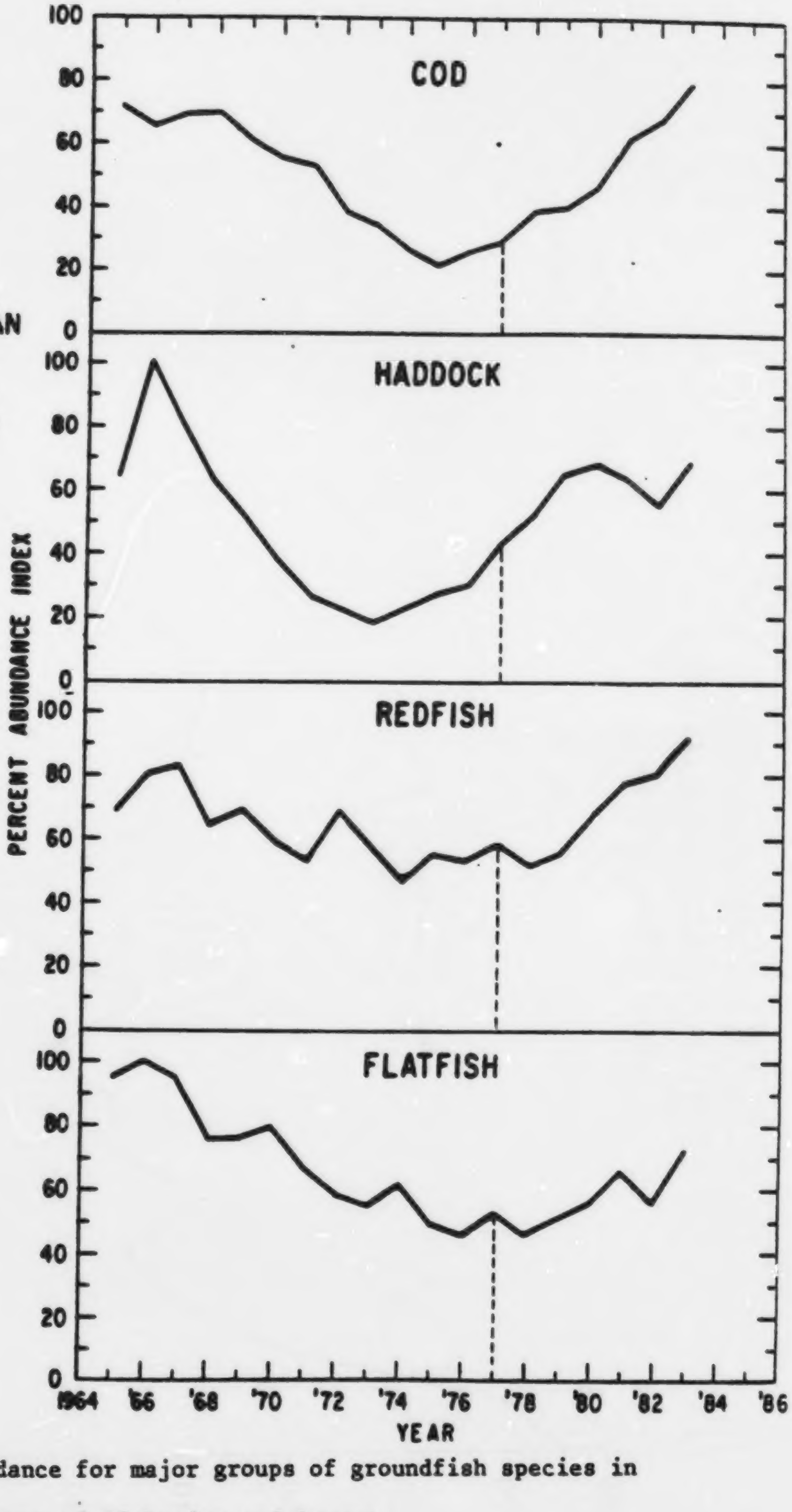


FIGURE 6-3
Northeastern Waters
of the United States

Source: Department of Fisheries and Oceans

FIGURE 6-3A

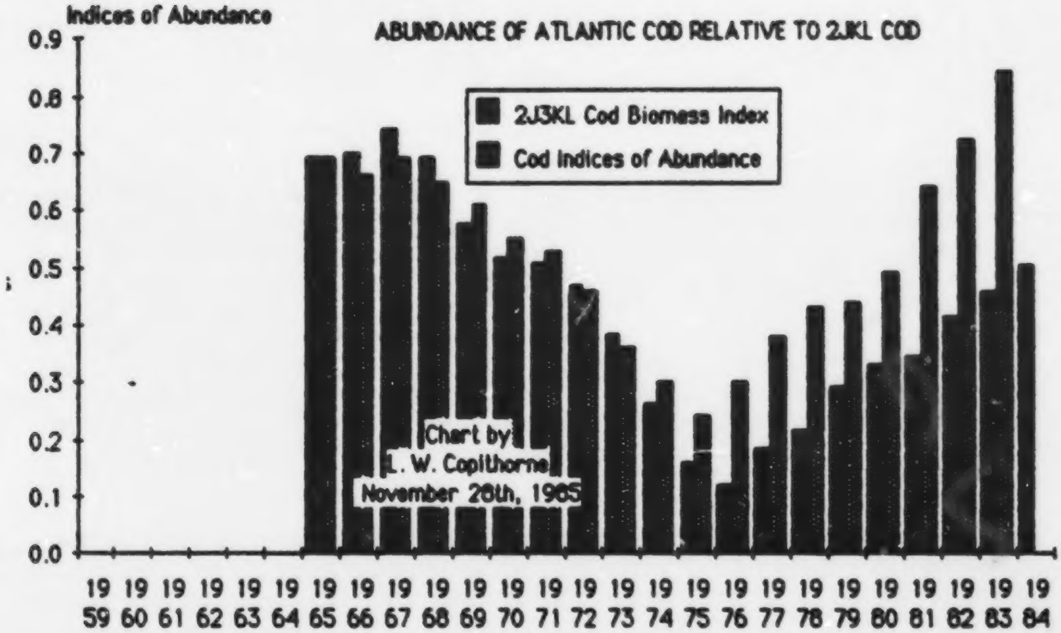
RECOVERY OF CANADIAN
FISH STOCKS AFTER
EXTENDED FISHERIES
JURISDICTION IN 1977



Indices of abundance for major groups of groundfish species in Subareas 2-4.
Source: Department of Fisheries and Oceans

See W.G. Doubleday, A.T. Pinhorn, R.G. Halliday, R.D.S. Macdonald, and R. Stein, "The Impact of Extended Fisheries Jurisdiction in the Northwest Atlantic." Mimeograph, Department of Fisheries and Oceans, 1985.

FIGURE 6-4



Source: Dept. of Fisheries Oceans

So far the Department of Fisheries and Oceans has not been able to find the political consensus necessary to allow it to institute a simple system of fully transferable licences for both people and vessels in the Newfoundland Fishery that is free of red tape. Until government establishes a trusted income maintenance system which operates totally independently from the fishery and fishermen's unemployment insurance, one cannot expect the Department to curtail entry much more rapidly or effectively than it has. The lack of a satisfactory income maintenance scheme has given rise to the current socially divisive attempt to define first and second class citizens in the fishery--full timers with special priviledges, and part-timers who have a more difficult time getting access to Fishermen's Unemployment Insurance Benefits (which on the Northeast Coast are--on average--more valuable than the net income from the fish themselves (see New Table 6-2)). Clearly there is still opportunity for additional persons to enter the fishery as crew members without forcing the exit of any other fisherman. There is no effective means of encouraging some three quarters of the 28,000 to 30,000 fishermen who are redundant to the industry to leave it. And they won't leave it until someone gives them an alternative income maintenance scheme.

If an alternative income maintenance scheme were in place, there seems little doubt that the thousands of people who fish for the minimal number of weeks to qualify for U.I. or who cut fish for the minimum number of weeks to qualify for U.I. in a small seasonal fish plant would leave the industry voluntarily. They left it after 1964 (ECC Table 6-2). This work habits of this group have been demonstrated to be remarkably responsive to the minimum number of weeks rule as evidenced by the data on U.I. If the political pressure could be allowed to escape through an independent income maintenance system, there would be little need to impose the red tape associated with the "full time-part time" categorization; there would be much less opposition to imposing strict limits on the number of personal fishing licences and making them transferable; there would be much less difficulty in buying back personal fishing licences and the species specific licences associated with the vessels.

Until there is an income maintenance system set up independently of the fishery, there is not much sense in suggesting that the government trying to buy back fishing licences. The price the government would have to pay to coax people to surrender the licences would reflect the capitalized value of the Unemployment Insurance Benefits to which the licence currently provides access. One department of government would be trying to buy the capitalized benefits provided by another department of the same government.

## Enterprise Allocations

Perhaps the single most successful application of a policy consistent with the Economic Council recommendations has been the introduction of "Enterprise Allocations" in the offshore fishery (Department of Fisheries and Oceans, *Enterprise Allocations for the Atlantic Offshore Groundfish Fisheries*, Dec. 22, 1983). The Economic Council had recommended a gradual strategy (which it developed in consultation with persons in Fisheries and Oceans as well as outside contractors) to introduce a system of transferable landing rights for Canadian fishermen, beginning in the Atlantic groundfishery, then extending into inshore herring and longliners. It implicitly left open the prospect that this system of transferable landing rights might one day be extended into the inshore fishery when the inshore fishermen had had enough time to see the benefits this system would bring to the participants in the other parts of the fishery to which it applied.

In the fall of 1981, the Department of Fisheries and Oceans decided to experiment with such a system of "enterprise allocations" among the four major companies in the offshore fishery and the dozen or so smaller companies which held some 25-30 licenses to operate one, two or three trawlers each. The Department allocated a fixed amount of the total allowable catch to the offshore fleet in 9 major groundfish species in 24 stock areas.

In consultations with the Department the large companies agreed to allocate their share among themselves on the basis of their historical catch in each species and each area. Each company was guaranteed its right to a specified amount of fish in each species and area to be taken within the fishing season at a time of its own choosing. Some transfers of fishing rights between companies could be (and were) negotiated on a barter basis (with the involvement of the Department) to balance by-catch problems within the overall quotas. The companies liked the new system because they could then fish to meet the needs of the market. They became more market-oriented, deploying their trawlers into different fish stocks at different times of the year--not in a made race to catch all the fish they could before someone else caught them--but to take those parts of their guaranteed quotas that were most profitable on the market at that particular time.

This called for a reorientation of duties: the marketing agents in the companies began to exercise influence on where trawlers were to fish--previously the captains' prerogative. In addition, the methods of remunerating captains needed modification. Because they were no longer allowed to fish as much and as fast as they wanted, the captains were unable to maximize their own incomes under the rules that had previously applied whereby they were paid a share of the catch. But on balance, the large companies liked the new system because it allowed them greater control over their own economic efficiency. The Department of Fisheries and Oceans also liked the system. It still has to police the system to ensure that there are no quota over-runs but the Department and the companies have developed a monitoring system to handle the situation.

Meanwhile, the dozen or so smaller companies making up the Independent Offshore Group (IOG) decided to fish for their share competitively. Although their total quota was guaranteed to them, they each fished on a first come, first served basis until their total quota was taken, at which time their sector of the fishery was closed. Hence, they did not escape the mad rush to catch as much as they could before their competitors got all the remaining fish in the quota, and they were disappointed with the share of the total allowable catch allocated to their sector.

In 1983, the Kirby Commission recommendations on restructuring the Newfoundland fishery had come on stream and the Fisheries Minister De Banné decided to put the Enterprise Allocations in abeyance for a year. The allocations were put in abeyance while the bankrupt fishing companies were being restructured because the capital value of the enterprise allocations represent the value of the fish themselves (which technically belong to the Government of Canada) and are not part of the capital assets provided by the owners of the fish companies. In spite of the fact that the enterprize allocations were temporarily suspended, the big companies had found the system so useful that they continued to operate it informally.

In September of 1983 senior officials in Fisheries and Oceans tried to formalize the Enterprise Allocations. They negotiated administrative guidelines with gave explicit shares in each fishery zone and species to each of the big companies and another share to the IOG as a group. The Independent Offshore Group of companies then decided not to cooperate; they demanded a larger quota for their group. In subsequent negotiations, the larger companies offered part of their quota to the IOG to facilitate the working out of a five year agreement by which the large companies continued to have their individual stinted landing rights and the IOG companies continued to fish competitively from a tranche of the total allowable catch that was specifically allocated to them in each of the offshore fishing zones and species.

The plan seemed to work well in 1984. Some of the allowable catch was actually left in the water because there was a trawlermen's strike and a glut of cod on the market. The IOG did well in valuable species.

Late in 1984 when preparations for the 1985 allocation discussions were under way, the large companies were fairly satisfied with the system. The IOG companies began to organize themselves to lobby for more fish and to settle on allocations among themselves. They asked the Department for historic data on their own catches and they challenged each other to show their "demonstrated capability". (Some companies were demanding larger shares of the fish than they had historically been taking; in response, other companies demanded that they demonstrate their ability to take the amount of fish they were asking for.)

Subsequently, in late 1984, the new Fisheries Minister John Fraser approved the 1985 Atlantic Groundfish Management Plan negotiated.
For example, the plan called for the following allocation of the 2J3KL Cod:

| | | |
|---|---|---|
| Foreign Allocations | | 16,300 metric tonnes |
| Canadian Quota | | 249,700 metric tonnes |
| of which, | | |
| less than 65' | | |
| fixed gear licences | 115,000 | |
| mobile gear licences | 5,000 | |
| 65' - 100' | 4,000 | |
| over 100' | 115,700 | |
| Total Allowable Catch, 2J3KL Cod | 266,000 metric tonnes | |
| Plus Resource Short Plant Program | 10,000 metric tonnes | |

Clearly, most of the cod was allocated to the inshore fishery (but not as much as the Newfoundland Government would like). When all 5,000 metric tonnes of the inshore quota have been taken by mobil gear, that fishery is closed. However, fixed gear fishermen on the Northeast Coast of Newfoundland are on a system of "allowances" by which they are allowed to catch as much as they gear can catch regardless of whether the 115,000 limited is exceeded or not. The "allowance" is an average amount which they are expected to take in aggregate over a 10 year period. In good years they may exceed the Total Allowable Catch planned for them. In poor years they cannot achieve their Total Allowable Catch because the cod simply do not move inshore in sufficient numbers. In effect, this fishery is a highly variable one that is controlled more by the whims of nature. The inshore fishermen on this coast are not a real threat to the species because they cannot follow the fish out to sea. If the authorities can control the efforts of the offshore fleet, there is less need to control the inshore fishery.

Under the previous Federal Administration, the negotiations had preponderantly been carried out between the fishing enterprises and the federal government. The earlier Administration had been opposed to the "provincialization" of the fishery and it had largely by-passed the provinces in its dealings with fishermen. Under the new Administration, Fisheries Minister John Fraser had attempted to involve the provincial governments in the negotiations from November 1984 onward.

The issue of making the fishing allocations transferable has been put in abeyance and the entire five year plan that had been negotiated in the fall of 1984 has been put on hold--although the total allowable catch and allocation for 1985 had to proceed as planned.

A new Federal-Provincial Enterprise Allocation Working Group has been established. It reports to the Federal-Provincial Atlantic Fisheries Committee (which is the group that had put the 1985 guidelines on hold.) The new developments have caused some anger among the companies who consider that the enterprise allocations were their their plan in the first place and that the new negotiating forum has bypassed them. The Department of Fisheries and Oceans has, however, invited the companies to take the federal position paper, and come back with their own proposals for further discussion with the governments involved. Hence negotiations for the formation of the 1986 plan (which had to be announced before January 1st 1986) have proceeded. An arrangement to transform vessel licence fees into Enterprise Allocation access fees and to develop a system to free up the treatment of underutilized species has been negotiated.

The new system has experienced some additional problems: Some companies have left part of their quota in the water when they found it unprofitable to sell to a glutted market or when they were unable to resolve labour disputes in time to take their entire allocation. They did not want to permanently sell this quota for fear of losing future rights. Other parties have demanded access to these uncaught fish. The new enterprise allocation access fees, which are intended to overcome some of these problems, are now in effect until 1988.

The new system has also made enforcement more challenging. Now that they are guaranteed their catch, some of the large company trawlers have allegedly been dumping smaller (less than eighteen inch fish) at sea after they have caught them. (Smaller fish are less suited to fillets and have to be sold as less valuable cod blocks to be processed into fish sticks. Smaller fish have a lower percentage yield of marketable product.) In addition, the fishing vessels are now much more dispersed on the fishing grounds as different companies pursue different fish stocks to meet the special marketing demands of their agents. (Prior to enterprise allocations, the fleet tended to pursue each fish stock at the same time until its total allowable catch was exhausted before they moved on to the next stock.)

In spite of the problems, this new system of Enterprise Allocations has obviously set in motion a system of property rights that have a self-sustaining, self-policing character that has a momentum of its own and which is controlling over-entry and overfishing. The outlook for its continued success in the offshore fishery is hopeful, but its future is somewhat precarious, given the political struggles going on among the provincial governments as well as the operating companies involved.

Progress is also being made on linking Enterprise Allocations with Access Fees. The rationale is that these fees, amounting to some $289,700 in 1982 (about $0.63 per tonne of fish) should cover the cost of administering the licensing system. Although current plans are confidential because the system is still under negotiation, there is the possibility of getting each company to pay for its enterprise allocation based on the market value of the fish it is to be allocated in each of the 9 species in each of the 24 stock areas. As the Economic Council expected, establishing a system of property rights automatically encourages participants to work out a self-policing market mechanism. While the current system is aimed at administrative cost recovery, it seems to be leading toward a method of valuing the enterprise allocation in each of the 9 species and 24 stock areas at the economic rent of the natural resource.

As the Economic Council had hoped, the idea of stinted landing rights has also begun to move--very modestly--toward the inshore, but the experiment is running into trouble which may give the system an unwarranted bad name. There has been a limited attempt to move the enterprise allocation system into the 4RS3Pn stock off the West Coast of Newfoundland. But, in an attempt to provide enterprise allocations large enough to satisfy all the fishemen involved, it seems the Department may have over-allocated this fishery. To make matters worse, there have apparently been some instances in which fishermen have misreported their fishing--to lead authorities to believe that they had landed fish taken in distant northern waters, when in fact they had taken them from the nearby 4R and 4S zones. As a result; the fish stock may be seriously depleted this year with the result that the existing enterprise allocations may not be sustainable in future years--which may undermine confidence in the system.

Experience seems to indicate that no system can succeed without the understanding and cooperation of the fishermen involved. It is hoped that Enterprise Allocations will be tried for the first time in 1986 in the 65-100 foot vessel groundfish fishery and may succeed.

In short, the management of the Offshore Fishery through the institution of a system of property rights is making excellent progress.

## Gear and Boat Subsidies

The Economic Council also recommended that gear, boat and other subsidies be discontinued. To the author's knowledge subsidies of this nature have not been increased--much. But the value of subsidized loans granted by the provincial Fisheries Loan Board did get quite large in 1980-81 (ECC Table 6-2 continued). Certainly some of these subsidized loans continue to the present day.

## Income Insurance

The Council recommended a system of self-financing, compulsory income insurance for self-employed fishermen to protect fishermen from the wide swings in their incomes. Such a scheme was not established.

## Foreign Fishing

The Council recommended collecting the economic rents from fish allocated to foreign nations, and that the Canadian Government explore the possibility of stepping up surveillance in the Nose and Tail of the Grand Banks. It should proceed cautiously, but ultimately assume complete policing duties in those areas to ensure that the international regulations are being enforced. In the summer of 1985, there was a public outcry upon revelations that foreign nations had bribed Canadian observers policing the offshore fishery, and that some vessels from the German and Spanish fleets had ravaged the fishery stocks in the Nose and Tail of the Grand Banks.[5] Data on Cod stocks under Canadian control show recovery, including the nose and tail of the bank to which areas fish under Canadian jurisdiction for part of the year may migrate at other times of the year. But stocks on the Flemish Cap which are entirely outside Canadian jurisdiction have not recovered at all (DFO Figure 10). Clearly the problem still remains. In response to a Canadian proposal at a recent North Atlantic Fisheries Organization meeting to close the tail and nose of the Grand Bank, NAFO has agreed to a temporary moratorium on the fishing of 2J/3KL Cod on the nose of the Grand Banks, but not the tail.

We now have eight years of experience with Extended Fisheries Jurisdiction introduced on January 1st, 1977. In 1974, three years prior to Canada's Declaration of the 200 mile fishing limit, Canada received only 18.3 per cent of the allocations of fish on the Atlantic Coast of Canada as established by the International Commission for the Northwest Atlantic Fisheries (ICNAF). The remainder went to foreign vessels (see Department of Fisheries and Oceans (April 1985) *Developments in Foreign Allocations on the Atlantic Coast of Canada Since the Extention of Jurisdiction* (Ottawa: Supply and Services Canada)). In 1984, Canada received 76.9 per cent of the total allocation both within and outside the 200 mile zone.

When the 200 mile limit came into force there were surpluses beyond Canadian requirements, so under Article 62 of the Law of the Sea Convention, foreign vessels were permitted to fish for the surplus. Now, however, Canadian harvesting capacity has increased and foreign fishing has been sharply reduced. Canada still allows some foreign fishing under a former Canadian policy of exchanging fishing allocations for improved access to foreign markets. The history of allocations of total allowable catch in throusands of metric tonnes of fish of all species is shown in New Table 6-3. (The actual catch differs from the initial allocation.)

Under Canadian jurisdiction the total allowable catch has been reduced to allow fish stocks to recover from severe overfishing. The TAC of 2J3KL Cod in 1980 was one third of its 1975 level, and has since been increased a little. Between 1975 and 1984 the allocation for Canada has been doubled.

The actual catch differs dramatically from the total allocation (New Table 6-4). The actual Canadian catch in total cod (not shown) exceeded the allocation by 30 per cent in 1978. In Northern Cod (2J+3KL), however, overfishing of some 22.9 per cent in 1977 was reduced as the Canadian allocation increased three and a half times from 70,000 metric tonnes in 1977 to 246,000 metric tonnes in 1984 as foreigners were gradually excluded from the fishery and as the fish stocks recovered. The actual Canadian harvest of Northern Cod rose two and a half times from 86,000 metric tonnes in 1977 to 214,000 metric tonnes in 1983. (A trawlermen's strike in 1984 helped hold the actual catch some 16 per cent below the total allowable catch.)

DFO FIGURE 10

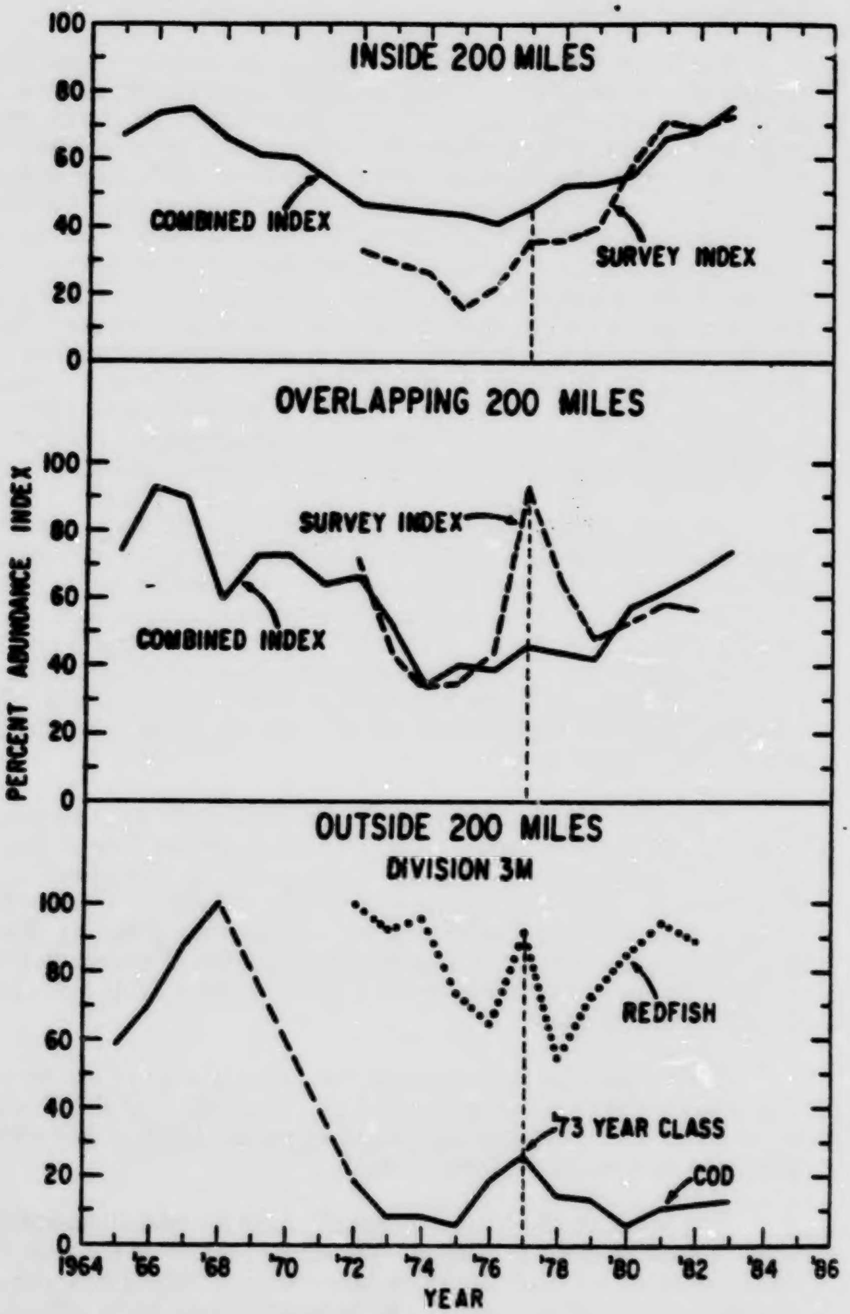


Figure 10. Indices of abundance for groundfish stocks within, overlapping, and outside Canadian 200 mile zone in Subareas 2-4.

Source: Department of Fisheries and Oceans

See W.G. Doubleday, A.T. Pinhorn, R.G. Halliday, R.D.S. Macdonald, and R. Stein, "The Impact of Extended Fisheries Jurisdiction in the Northwest Atlantic." Mimeograph, Department of Fisheries and Oceans, 1985.

# HAS THE PROMISE OF EXTENDED FISHERIES JURISDICTION BEEN REALIZED?

In 1980, the Economic Council spoke of increasing the harvest of the Northern Cod stock from 173,000 tonnes in 1977 to 400,000 tonnes by 1985. Data on 2J+3KL Cod (New Table 6-3) indicate that the actual harvest rose from 179,100 metric tonnes (93,000 of it taken by foreigners) in 1977 to 224,100 tonnes (16,200 by foreigners) in 1984--with Canadians leaving some 38,000 tonnes of the total allowable catch in the water. That is to say, the allowable catch had recovered to only 262,200 tonnes--still short of the 400,000 tonne objective believed possible in the earlier document. The Kirby Report expects this stock to attain 400,000 tonnes in 1987. (In 1968 the foreign catch from the stock exceeded 800,000 tonnes, an amount significantly above the sustainable harvest.) DFO now advises that the 400,000 tonne projection has been reduced to 326,000 by 1990. Hence, there has been substantial recovery of the natural resource, but not yet to the level expected earlier. The fact that companies willingly left some of the cod in the water confirms earlier fears that Canada would have difficulty gaining access to the markets which had previously utilized the cod stock. (Canada sells a lot of fish to the United States, but has poorer access to Europe and Soviet Bloc Countries. Whereas these countries were prepared to fish Canadian waters for themselves, there are unwilling to buy the same amounts of fish caught by Canadians and offered for sale.)

New Table 6-3
Allocations of Total Allowable Catch Versus the Actual Catch, 1977-84

| | Canada, All Species | | | 2J + 3KL Cod | | | |
|---|---|---|---|---|---|---|---|
| | | | | Canada | | | |
| Year | Allocation | Catch | Excess Catch | Allocation | Catch | Excess Catch | Allocation to Foreign Countries |
| | (thousand tonnes) | | | | | | |
| 1977 | 321.4 | 412.7 | 91.3 (28.4%) | 70.0 | 86.0 | 16.0 (22.9%) | 93.1 |
| 1978 | 484.2 | 462.3 | -21.9 (-4.5%) | 97.0 | 102.7 | 5.7 (5.9%) | 38.0 |
| 1979 | 521.7 | 534.1 | 12.4 (2.3%) | 145.0 | 130.9 | -14.1 (-9.7%) | 25.0 |
| 1980 | 585.5 | 594.6 | 9.1 (1.6%) | 155.0 | 148.2 | -6.8 (-4.4%) | 20.7 |
| 1981 | 760.7 | 643.0 | -117.7 (-15.5%) | 190.0 | 153.9 | -36.1 (-19.0%) | 11.4 |
| 1982 | 835.0 | 662.3 | -172.7 (-20.7%) | 221.3 | 213.5 | -7.8 (-3.5%) | 15.4 |
| 1983 | 890.2 | 651.0 | -239.2 (-26.9%) | 243.5 | 214.5 | -29.0 (-11.9%) | 17.8 |
| 1984 | 900.9 | 638.7 | -262.2 (-29.1%) | 246.0 | 207.9 | -38.1 (-15.5%) | 16.2 |

Source: Department of Fisheries and Oceans (April 1985) *Developments in Foreign Allocations on the Atlantic Coast of Canada Since the Extention of Jurisdiction* (Ottawa: Supply and Services Canada)

Note: The allocations in Table 6-3 do not match the total allocations in Table 6-4

New Table 6-4
History of Canadian and Foreign Allocation of Total Allowable Catch of Fish of All Species, Atlantic Coast of Canada

| Year | Canada | | Foreign Countries | | Total Tonnage Allocated |
|---|---|---|---|---|---|
| | '000 tonnes | % | '000 tonnes | % | |
| 1974 | 582.1 | 18.3 | 2,605.2 | 81.7 | 3,187.3 |
| 1975 | 551.2 | 16.6 | 2,777.3 | 83.4 | 3,329.1 |
| 1976 | 427.2 | 17.5 | 2,020.9 | 82.5 | 2,448.1 |
| 1977 | 409.4 | 32.4 | 853.0 | 67.6 | 1262.4 |
| 1978 | 631.7 | 44.9 | 776.0 | 55.1 | 1,407.7 |
| 1979 | 769.8 | 61.0 | 435.3 | 39.0 | 1,115.0 |
| 1980 | 782.0 | 70.6 | 325.0 | 29.4 | 1,107.0 |
| 1981 | 959.9 | 76.2 | 299.4 | 23.8 | 1,259.3 |
| 1982 | 1,057.6 | 78.7 | 286.0 | 21.3 | 1,343.6 |
| 1983 | 1,086.0 | 79.8 | 274.6 | 20.2 | 1,360.6 |
| 1984 | 1,091.0 | 76.9 | 327.8 | 23.1 | 1,418.8 |

Source: Department of Fisheries and Oceans (April 1985) *Developments in Foreign Allocations on the Atlantic Coast of Canada Since the Extention of Jurisdiction* (Ottawa: Supply and Services Canada)

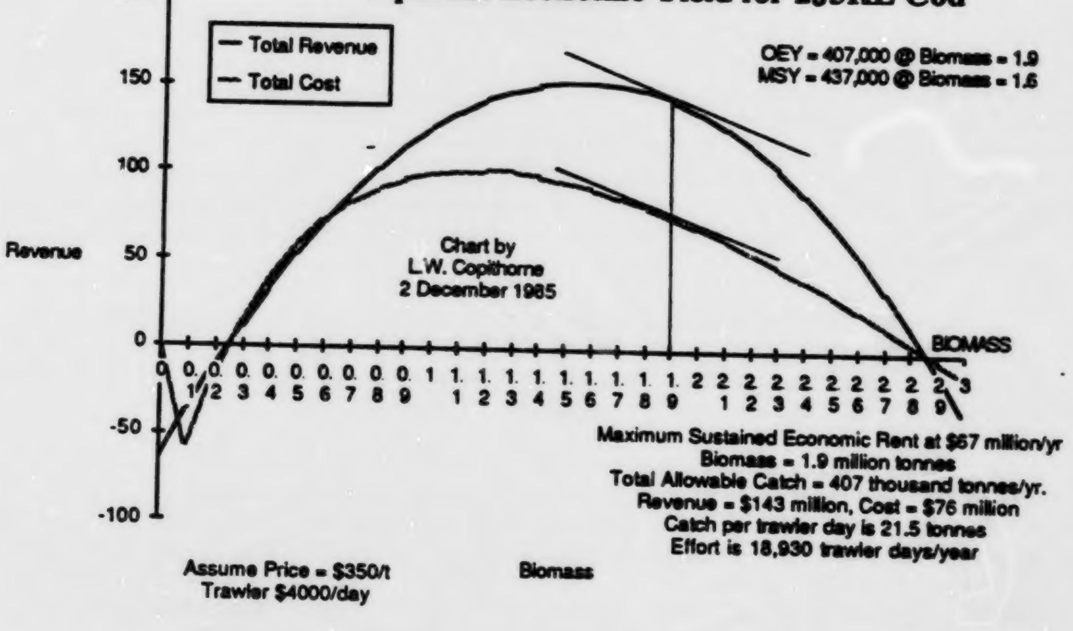
## Fitting a Fisheries Model

Following Munro (1980) the author has fitted a simple fishery model to 2J3KL Cod data for 1962-1984 (Figure 6-3 and Appendix F). This model illustrates the view held earlier by DFO that 400 thousand tonnes was a reasonable economic objective to aim for. It also explains why little economic rent exists at recent levels of biomass where the annual allowable catch has paid for the cost of harvesting, but not much more. If one could believe the simple model, the optimal economic yield would be found at a biomass level in the order of 1.7 to 2.1 million tonnes with an annual harvest of some 420 -350 thousand tonnes.

## Quality Control

The Council recommended that an independent board be created to establish quality standards and to develop, institute, and enforce a system of quality grading and quality control in the North Atlantic Fishery. Some progress has apparently been made, there is some dockside grading, but no such board has been established, and some political forces in Newfoundland still oppose gutting, bleeding and washing fish at sea for fear that other provinces and nations may thereby be able to enter the fishery and transport the semi-processed fish to home ports outside Newfoundland.

## Figure 6-5
## Optimal Economic Yield for 2J3KL Cod



OEY = 407,000 @ Biomass = 1.9
MSY = 437,000 @ Biomass = 1.6

Chart by
L.W. Copithorne
2 December 1985

Maximum Sustained Economic Rent at $67 million/yr
Biomass = 1.9 million tonnes
Total Allowable Catch = 407 thousand tonnes/yr.
Revenue = $143 million, Cost = $76 million
Catch per trawler day is 21.5 tonnes
Effort is 18,930 trawler days/year

Assume Price = $350/t
Trawler $4000/day

# RESTRUCTURING THE NEWFOUNDLAND FISHERY

An economic crisis in the fishery in 1981-82 prompted the formation of the Kirby Task Force on Atlantic Fisheries which reported in December 1982. Subsequent negotiations gave rise to the *Agreement Between the Government of Canada and the Government of Newfoundland and Labrador Concerning the Restructuring of the Newfoundland Fishery* on September 26th, 1983. The new structure centres on Fishery Products International--a giant "temporary" crown corporation assembled from the wreckage of 8 bankrupt private companies, all of whose major shareholders and most of whose top level management have now been replaced. Whether this restructuring becomes an understandable failure or a remarkable new success may turn crucially on whether governments take steps to lift the province's income maintenance problem from the shoulders of those who are trying to rebuild the fishery.

If Government leaves the new management to cope with the political problems of disguised unemployment and rural poverty outlined above, Fishery Products International will have a remarkably difficult time divesting itself of uneconomic fish plants and operating efficiently. On the other hand, if the company's management in cooperation with the Fishermen's Union should prove strong enough to follow its own business plan to create a commercially successful company based on well-paid, full time commercial employment that does not depend on subsidies and Unemployment Insurance, then governments will still have to cope with the large number of underemployed fishermen and fish plant works who will be cast off. One way or another the income maintenance problem will assert itself.

In the following text, the author first presents the facts surrounding the difficult birth of Fishery Products International (FPI). This is followed by a much more positive evaluation of the future emanating from interviews with the new President and CEO of the company, and with the leader of the Fisherman's Union.

The 1981-82 economic crisis itself had many dimensions but was primarily a classic cost - price squeeze that left the major fishery companies bankrupt (Kirby 1982, p 21-22). A lot of new vessels and fish plant capacity had been added in euphoric anticipation of the larger harvests that were to be made possible by Extended Fisheries Jurisdiction. But it should not be forgotten that, in the competition for a common property resource even provincial governments will enter the race to promote the expansion of local catching and processing capacity in an effort to capture the fish before other interests do.

According to Kirby,

"The cost of producing each pound of fish has been rising rapidly in recent years, while the revenues earned from selling each pound of fish have remained almost flat."

"Work stoppages paralyzed the Newfoundland fishery in the summer of 1980. Herring prices collapsed in 1981. Trawler prices in Nova Scotia had been falling."

"In the late summer of 1981, there were widespread closures of processing plants, mainly in Newfoundland and Nova Scotia; some 4000 people were without work. Canada's Scandinavian competitors in the U.S. market gained an advantage when their currencies declined far more than the Canadian dollar did against the U. S. dollar. At the same, time, the U.S. market for fish softened suddenly. U.S. buyers of Canadian fish, faced with high interest rates, reduced their inventories, in effect forcing Canadian firms to hold higher inventories than usual. In turn, Canadian firms had to finance these stockpiles of fish at interest rates even higher than those in the United States. In response to bulging inventories and to a lack of fishing quotas for species that could be marketed economically, some of the trawler companies temporarily shut many of their plants and tied up their fleets."

"The Lake Group and H. B. Nickerson & Sons found themselves in a financial crisis that, by November 1981, would lead them to request financial aid from the federal government. They were joined by many smaller companies and by joint appeals for assistance from fishermen's and processors' organizations. In the business community, there were fears of widespread failures. In the hundreds of communities that rely on the fishery, there were fears that shutdowns might be permanent; some took vigorous action to make their desires known to the companies and governments. Late in 1981, fisheries minister Roméo LeBlanc announced a program of stop-gap aid amounting to $15 million to help companies get through the worst of their inventory problems." (Kirby 1982, p 21)

The Kirby Report was well received by the federal government which accepted some 51 of the 57 recommendations made, including a revision of fishermen's unemployment insurance by which benefits came to based on the best 10 weeks fished for fishermen who fish at least 15 weeks. This provision had a noticeable effect on lengthening the number of weeks fished in Newfoundland in 1984.

In subsequent negotiations to cope with the problem of bankrupted companies, the province did not agree with the federal proposal assembled by Michael Kirby and Price Waterhouse to form one giant crown corporation to absorb the assets of the private companies (Newfoundland Presentation to the Federal Cabinet Committee on Fisheries Restructuring, March 23rd, 1983). The province wanted a single harvesting company and a single marketing company, but it wanted to retain the processing sector as it was under new management. The province feared that the processing sector was already larger than existing managers were able to cope with effectively. The province wanted a "social compact" with the Fishermen's Union whereby the Union be allowed to acquire shares in each of the recapitalized companies and contribute through a program of restraint and productivity enhancement. The province rejected profit maximization as a goal for the new company (in favor of maximizing the "net benefits" to Newfoundland), it rejected plant closures proposed by Price Waterhouse, it rejected factory trawlers which it suspected might be used by a new company, and it used the opportunity to call for the medium term harvesting quotas for each Province and for each enterprise, and for reallocation of existing foreign quotas of Northern Cod and the French quota in the Gulf of St. Lawrence to Newfoundland. Ultimately the federal view of a single company prevailed, but with a great many provincially motivated side conditions attached.

The September 26th, 1983 restructuring agreement subsequent to the Kirby Report was intended to create a government-held company, with employee participation, headquartered in Newfoundland (not a true crown corporation and not subject to the same rules of reporting and disclosure) to take over the assets of the essentially bankrupt larger fish companies in Newfoundland and operate them as an "economically viable, efficient and modernized" company until it could be rendered profitable enough to be sold back to private enterprise.

To prevent the company from becoming a political tool, an operating company, "with management being left to manage", was to report to a holding company which was to be held 60% by the federal government, 25% by the provincial government, 12% by the Bank of Nova Scotia and 3% by the employees who, it was hoped, would enter into "a social compact" with the major shareholders to avoid putting an impossible wage burden on the floundering company. Since the provincial and Bank shares were to be made up by converting previous loans into equity, it was only the federal government which was expected to inject $75.3 million in new equity to keep the company afloat.

As events turned out, the trawlermen represented by the Newfoundland Fishermen, Food & Allied Workers, entered a lengthy strike (June '84 until February '85) instead of the social compact. Therefore the federal government picked up 62% of the equity in the company, somewhat larger than was originally intended.

The many side conditions of the agreement included the following: plant closures, plant mergers, mechanization, or trawler transfers affecting more than 100 people, would need approval of both governments--with the government which opposed that action assuming the additional costs associated with the continuation of existing operations, as determined by a firm of chartered accountants. The company would be a vehicle through which independent Newfoundland fish companies meeting quality standards may market their product. The company's trawlers could be called upon under certain circumstances to provide fish to independently owned plants under the Resource Short Plant Program. The company is obligated to keep the plants at Harbour Breton, Gaultois, Ramea and St. Anthony open "for the forseeable future." The company must reopen the Burin plant, upgrade and expand it as a secondary processing and trawler refit center. Plants at Grand Bank, St. Lawrence and Fermeuse must be reopened. Factory trawlers would not be permitted (a condition abrogated by the federal acting Fisheries Minister in November 1985). The existing processing licence freeze will be continued. A major share of the trawler replacement program shall be undertaken at the Marystown shipyard.

In the September 26th 1983 agreement, there was provision for the possible extension of the Fishery Products International model in the form of a new "Northern Fisheries Development Corporation" to include the troubled plants at St. Anthony "and those plants on the Labrador coast which the private sector is not prepared to operate".

There was to be a Burin Peninsula Development Fund to diversify the economic base and to provide employment there.

The Board of Directors--none of whom could be public servants--would consist of 11 members--5 appointed by the Federal Government, 3 by the province, 1 by the Bank of Nova Scotia, 1 by the employee shareholders, with the Chairman (who would also be CEO) appointed jointly by both governments.

It took 14 months and a change of Federal Government (Globe & Mail Nov. 19, 1984) to appoint Victor Young as the new Chairman of the Board, President and Chief Executive Officer on November 5th, 1984 (DRIE press release). Mr. Young is a former public servant: he is a former Deputy Minister of the Treasury Board and former Special Adviser to the Premier. He was President and CEO of Newfoundland and Labrador Hydro at the time of his appointment.

Final amalgamation of the plants into the new company was not achieved until December 31st 1984. By that time interim chairman, Andrew Crosbie, was quoted as saying the company had almost no hope of becoming profitable before 1990 unless it received $100-$125 million in the next five years.

Fisheries Products International Ltd., established in 1983, is now a vertically integrated seafood company with 32 primary processing plants, and its own secondary processing plants and marketing operations in the United States and Europe. FPI employs 9,000 people on its 64 trawlers and in its 32 processing plants. Although it does not own some of the more productive fish plants in the province belonging to National Sea of Nova Scotia, the new moves effectively converts about 80 per cent of the Newfoundland fishery from the independent private sector fishery to a government-owned, or government-influenced sector. (The federal government is part owner of National Sea.) The remaining independent private fishing companies in Newfoundland are a relatively small and dispersed group.

Partly as a result of the delays in setting up Fishery Products International, the costs of the actual restructuring, as of July 31st, 1985, have escalated in terms of both equity injections and loan guarantees which were ultimately converted into equity (New Table 6-5 and subesequent text). The original $150 million "restructuring" first become a $225 million "refinanancing" without "restructuring"; the side conditions of the original agreement prevented "restructuring" as a private company would want to do it. Then in early October 1985, management publicly released its new business plan approved by the Board and both goverments, outlining a method by which it would try to divest itself of 15 fish plants and become profitable in 1986. Whether periodic financial injections of the kind portrayed in New Table 6-5 will be needed to keep the company going within the constraints under which it was established or whether the company--with government cooperation--can divest itself of those constraints, remains to be seen.

New Table 6-5
Fishery Products International Refinancing
Prior to the October 1985 Business Plan

| | Equity | | Loan Guarantees | | Total |
|---|---|---|---|---|---|
| | 19-4-84 | 31-12-84 | 13-9-84 | 31-7-85 | |
| Canada | 75.3 | 15.5 | 17.6 | 17.6 | 126.0 |
| Newfoundland | 31.5 | 6.5 | 7.4 | 7.4 | 52.8 |
| Bank of Nova Scotia | 44.1 | 3.0 | - | - | 47.1 |
| Total | 150.9 | 25.0 | 25.0 | 25.0 | 225.9 |

Source: Department of Fisheries and Oceans

With the acceptance of the company's business plan in early October, the governments agreed to convert the outstanding loan guarantees to equity and to infuse an additional $54.8 million dollars. Effective December 1985 the ownership of FPI is be approximately as follows:

| | Equity | Loan Guarantees | Total |
|---|---|---|---|
| | | $ millions | |
| Canada | 167.6 | 0 | 167.6 |
| Newfoundland | 66.2 | 0 | 66.2 |
| Bank of Nova Scotia | 47.1 | 0 | 47.1 |
| Total | 280.7 | 0 | 280.7 |

When one reads the September 26th 1983 agreement to restructure the fishery and sees the costs of refinancing Fishery Products International against the backdrop of the long history of government-related investments in Newfoundland (Economic Council 1980, Chapter 1) and interprets them in the light of the provincial government's declared philosophy of economic development (***Managing All Our Resources***, 1980), there are grounds for some concern. -

In 1980 the Economic Council documented the financial problems of government involvement in the "new industries" which failed after they had been launched from the $40 million cash surplus inherited from the Commission of Government at Confederation in 1949. It also documented difficulties with the natural resource investments of the 1950's, the Marystown Shipyard, the Long Harbour phosphorous plant, the Come-by-Chance Refinery, (the largest bankrupcy in the history of Canada at the time), and the $300 million provincial loss on Labrador Linerboard (a loss representing about 40 per cent of the province's gross financial assets at the time). Against this backdrop, the current initial injection of somewhat more than a quarter of a billion dollars into Fishery Products International seems consistent with history. (The $280 million injection is double the 1984 gross value of fish landings in Newfoundland.)

But there is an important difference. On Labrador Linerboard, it was the provincial government that lost the money. On Churchill Falls, it was the people of Newfoundland who lost the economic rent to Quebec. This time, on Fishery Products International, most of the loss is automatically ear-marked for the federal government in a new form of subsidy, namely the continuous injections of "new equity" that have so far been necessary to prevent the loss of the only apparent means of "gainful" employment in every nook and cranny of Newfoundland from St. Anthony to Cape Spear.

The President of Fishery Products International declares that he and the corporation have not been subjected to political pressure in corporate decision making. Nevertheless, it is realistic to worry about the political economic temptations that the new corporation holds. Can a government-owned corporation headquartered in the provincial capital, which controls over half the employment in the highest political profile industry in the province and which implicitly controls access to the single, largest block of Unemployment Insurance Benefits, ever be expected to be "well managed on a commercial basis with managment being left to manage"? -- especially when the provincial governments' own negotiating stance explicitly rejected profit maximation as a goal for the corporation?

*Managing All Our Resources* is just one among several provincial government documents that make explicit a policy by which the provincial government must gain control over the natural resources--both offshore and on shore--so it can exploit the natural wealth of those resources and tie jobs to them (with Newfoundland-first policies for hiring, procurement and processing), and then exercise discretion to direct those jobs into remote parts of the province of its own choosing. (See also the provincial policy documents of recent years with respect to offshore oil development and and the fishery.) The history of intergovernmental negotiations demonstrates that the province is always vigilant to ensure that the federal government honour its legal obligations to continue subsidies wherever such obligations have been entered into in the past, be that an obligation to pay the Gulf Subsidy, to assume the loss on the railroad, to pay subsidies for coastal service or unemployment insurance. It is conceivable that the continued existence of federal subsidies for income maintenance, transportation programs and Equalization Payments are necessary to finance the provincial policy of *Managing All Our Resources* . Certainly the latent economic rents in the fishery, forestry, mining, and offshore oil are insufficient to finance the jobs so created.

Seen against the backdrop of history, the Fishery Products International Business Plan released on October 2nd is remarkable. The new cooperative environment between the union and management--confirmed independently by the leaders on both sides--is equally remarkable. Some of the initial decisions taken seem consistent with the role of a commercial enterprise, and not with the role of a government corporation attempting to sustain existing seasonal incomes by generating eligibility for unemployment insurance.

While operating all the plants imposed upon it, FPI plans to divest itself of 8 of the plants it currently owns and 7 of the plants it currently leases, but only on terms where the potential buyer "can ensure a realistic future for its operations." (Otherwise, the failed plants would probably have to taken over again.) The 15 plants scheduled for divestiture are all seasonal, typically operating only 3 to 4 months per year, none more than 6 months per year. While they do not fit in profitably with the mainline operations of Fishery Products International, it is conceivable that they might be profitably be operated by managers who could devote their entire attention to the survival of these operations.

The main operations of Fishery Products International will be centred on eight deepsea trawler plants operating 6 to 11 months per year, one deepsea scallop operation, six inshore plants, three secondary processing plants, one refit centre. Not all of these plants are exactly what a company would want to start out with, but it is more economic to operate them than to try to incur the costs of closing them. Both the nearby plants of Grand Bank and Fortune will operate nine months per year utilizing their joint fleet of thirteen stern trawlers. Fishery Products Incorporated, a wholly-owned subsidiary of FPI will remain the primary marketing arm for products in the United States. It will assist independent operators in Newfoundland to market their products world wide. Secondary processing plants in Danvers and Boston will process Newfoundland product in the United States.

## Overcoming Typical Expectations

Although the bulk of the fish processing sector of Newfoundland was essentially bankrupt, no employees apart from those at Burin lost their jobs. The governments stepped in to pick up the pieces and hand out subsidies, much as the voters would expect to prevent rural Newfoundland from collapsing. Most of the fish plant work has now been transformed into 'government jobs'. Against the backdrop of Newfoundland history and the provincial government's declared negotiating position that the corporation should not be run for profit, it is reasonable to expect trouble in convincing workers that FPI is really serious about being a non-subsidized, commercial operation. The 14 month delay in detting a Chief Executive Officer left the company drifting. The cost of the bailout increased. Government paid the bill, as expected. The trawlermen struck for higher pay and benefits--a strike lasting 7 months.

Against the backdrop of bitter labour relations in this industry, the unprecedented four-year contract and the apparent mutual respect that now exists between the company and the union is surprising. After two years with no wage increase prior to the new contract, the new contract calls for annual wage increases of 2%, 2%, 3% and 3%--not unreasonably low for in industry being bailed out of bankrupcy, but a remarkable achievement never-the-less. It would seem to be a meaningful signal from both the company and the union that they are committed to making FPI a commercially successful operation.

Prior to settling the contract the company showed the union that it wanted to rationalize the trawler fleet, decommissioning 6 trawlers (by which 84 trawlermen would lose their jobs) and redeploying 15 vessels to different ports, affecting over 200 trawlermen. This arrangement was one of the factors which caused the membership to reject the contract the first time around. It is largely a credit to the strength of union management that agreement was ultimately achieved in a 55% to 45% vote of the membership.

There also seems to be evidence--independently confirmed by both management and the union--of a number of substantive decisions on redeployment of resources within the corporation that could not help but be politically controversial, but which seem to have been effected with the active involvement of the union and without the intervention of politicians. Methods of communication between FPI and the Fishermen's Union seem to have improved markedly, and the families who work for Fishery Products International may have also come to realize that when an industry has been virtually bankrupted, that some redeployment of the corporation's resources may be necessary for the industry's survival.

It is remarkable that the government shareholders have accepted the business plan which calls for the divestiture of 15 plants with will obviously cause some concern for governments. Conceivably the appointment of a blue ribbon Board of Directors who have little past allegiance with the fishery has been important.[6]

FPI had a $25 million loss in 1985. In the President's view, how can the company achieve a $25 million turnaround in 1986? First, the trawlermen's 7 month strike lasted to February 1985 so that FPI's inventories and market reputation were largely lost during the first quarter of 1985 when fish sales for Lent are high. That may have cost the company

$8 million. Second, January and February are the best months for catching the best quality northern cod. Having the trawlers tied up at that time may have lost $4 to 5 million. Third, the latest debt to equity conversion will reduce the company's interest charges on outstanding loans by some $6 to 7 million. Fourthly, the company fished for flatfish at the wrong time of year in 1985 in an effort to recover from the strike. Recovering from those four problems, coupled with other improvements in the business plan, makes a profit in 1986--and beyond--look possible.

But what if the 15 plants up for divestiture cannot be divested? How can the incomes of their employees be maintained without interfering with the commercial operation of FPI? Some of these plants truly have employees who work only about 10 weeks per year before relinquishing their jobs to other neighbors who then work up their eligibility for Unemployment Insurance before the plants close after about three months of operation. How can both the federal and provincial governments hope to make economically sound decisions about these plants in 1988 (as called for in the business plan) when both parties in power should be up for re-election at that time? If the FPI is to survive commercially, it is important that both governments work to solve the income maintenance problem well before 1988.

## Possible Results of Restructuring

Senior executives of neither the company nor the union seem to expect pressure for work sharing and UI benefit generation in the big trawler plants owned by FPI and neither seem to expect political intervention in this sector. If the company could successfully divest itself of the fish plants it cannot profitably use, and if the current successful communication with the Fishermen's Union continues, there seems to be a good possibility that a strong and profitable commercial fishery in Newfoundland will shake itself loose from the traditional poverty and dependency of the inshore fishery. Whether or not FPI ever succeeds in selling its core operations to private enterprise may not matter. At the moment it is a Canadian corporation with a chance of success that appeals to union leadership much more than a foreign corporation would.

But there is some truth to the union leadership view that the current "restructuring" as an effort to look after the offshore fishery without coping with the income problems of the inshore fishery. The income maintenance scheme that is needed to alleviate the political problems hanging over both FPI and the Fishermen's Union may have to go somewhat beyond the income maintenance ideas suggested by the Economic Council recommendations 24 and 25 in *Newfoundland: From Dependency to Self-Reliance* in order to cope with the problems of the thousands of Newfoundlanders who are on the verge of being excluded from an economically independent commercial fishery. In fact, the *Report of the Royal Commission on the Economic Union and Development Prospects for Canada* (1985 Vol II, Chapters 15 on the functioning of labour markets and chapter 19 on the income security system) sees the problems with Unemployment Insurance and income maintenance much as the Economic Council members and researchers did. The Royal Commission also comes to the same policy solution that the Economic Council staff thought necessary--a Universal Income Security Program. At $3,800 per adult, the Royal Commission's recommendation would be in the same ball park as the current very imperfect income support program that has evolved through manipulating the operation of the fishery to maximize the use of Unemployment Insurance for this purpose.

If a Universal Income Security Program (UISP) were introduced, and if Unemployment Insurance were returned to true insurance principles as the Royal Commission recommends, it is probable that social pressure would dissipate over whether or not to maintain the operation of small isolated fish plants and whether or not to quarrel over who should have a "full time" fishing licence and who should be relegated to "part time". With their incomes secure, many outport people would not be as concerned about whether or not they had ten weeks of time cutting fish, and their life styles in the remaining 42 weeks of the year would hardly be different from what they are now. Some persons are currently not satisfied with $3000 in net fishery income supplemented by $3500 of Unemployment Insurance (New Table 6-2, Northeast Coast), but they hang on to what they have in the outport where they have access to the current income maintenance system. In the presence of the UISP, many of these people would not stop working, but they might take advantage of their portable UISP to take some work somewhere which pays more than $3000 per year--and without fear that they will cut themselves off the support system if they make the attempt.

But there is one clear warning about a Universal Income Security Program: like Unemployment Insurance and Enterprise Allocations, the USIP has its own peculiar irrepressable political momentum. When Unemployment Insurance was introduced, it became so popular that there was great pressure to increase its generosity and to manipulate economic activity to take advantage of it. When enterprise allocations were introduced, they were so useful that companies continued to operate the system even after government had suspended it. With a Universal Income Security Program there would be very little manipulation of economic activity to take advantage of it because all people would have access to it without manipulation. The real danger in the USIP is that, once installed, there will be irrepressable political pressure to increase the level of benefits until there is little advantage in working and the nation's entire system of economic incentives could be destroyed. Within the Economic Council in 1980, it was a wise old ex-public servant who had more than forty years of experience in devising and redivising virtually all aspects of Canada's income security systems who utterly refused to accept the idea of a Universal Income Security Program, and that is why it does not appear among the Economic Council's recommendations. If the USIP is installed, it had better be in the form of a statute that specifies that the total benefits of that program cannot exceed something like 25 percent of the Gross National Product, and it had better be difficult to change that statute.

## THE AMERICAN CHALLENGE

**In response to pressure from the fishing industry in the Northeastern United States in 1983, the United States International Trade Commission presented a Report to the President on Investigation No. 332-173, under Section 332 of the Tariff Act of 1930, as amended, entitled *Conditions of Competition Affecting the Northeastern U. S. Groundfish and Scallop Industries in Selected Markets.*, in December 1984. On January 3rd, 1986, the United States Department of Commerce ruled that a duty of 6.85 per cent should be imposed on imports of Canadian groundfish to offset what it said is a wide array of government subsidies for Canada's Atlantic fishermen and processors (*Globe and Mail*, Jan 4th, 1986). The Department ruled that 12 federal government programs and 19 provincial programs in New Brunswick, Newfoundland, Nova Scotia, Prince Edward Island and Quebec are unfair subsidies because they single out the fishing industry or regions of Canada for special financial assistance. The 89 page ruling also singled out as a subsidy some 1983-84 equity investments by the federal and Nova Scotia governments in National Sea Products Ltd of Halifax and by the federal and Newfoundland governments in Fishery Products International Ltd., of St. John's.**

**The United States is Canada's major market for fish. If there is to be any force that can curtain the amount of subsidization of the Canadian fishery, it may be American.**

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## Notes

* The author sincerely thanks persons who have reviewed earlier drafts of this manuscript and provided clarifications, some of which are included in important footnotes as well as in the current text. To avoid implicating these people, in the text that follows, the author does not name them, and he alone accepts responsible for the contents of this paper. The author is indebted to various senior and other officials in the Canadian Department of Fisheries and Oceans, the Provincial Department of Fisheries, the President and Chief Executive Officer of Fishery Products International, the President and Chief Economist of the Fishermen's Union, the Newfoundland Institute of Fisheries and Marine Technology, the Newfoundland Departments of Finance, the Executive Council and Intergovernmental Affairs Secretariat, the Federal Economic Development Coordinator in Newfoundland and certain members of the Economic Council of Canada.

1. Newfoundland opposed and still opposes the introduction of freezer trawlers to prevent fishermen in provinces like Nova Scotia from exploiting this resource (The Hon. T. Rideout, September 1985). The Newfoundland Government fears that the introduction of freezer trawlers or factory freezer trawlers into the Northern Cod Stock will allow a much smaller number of workers to harvest the majority of the cod and even do some of the processing at sea, before landing the fish in ports inside and outside Newfoundland, thereby allowing non-Newfoundlanders to access the Northern Cod which Newfoundland wants reserved to itself.

It was an acting fishery minister, The Hon. Erik Nielsen in early November 1985, who finally approved three factory freezer trawler licences for the Atlantic Fishery, notwithstanding clause 12 of the Canada/Newfoundland Fisheries Restructuring Agreement of September 26th, 1983 which states that factory trawlers will not be permitted to harvest Northern Cod. The first such licence will go to National Sea Products of Halifax for operation of a used factory freezer trawler out of Lunenberg using part of that company's enterprize allocation for up to 6000 tonnes of Northern Cod, with the requirement that half the vessel's catch be from under-fished stocks such as redfish and turbot. Factory freezer trawlers may not fish for capelin, a species providing a food supply which the cod follow into the inshore at spawning time each year, thereby providing the source of cod upon which Newfoundland inshore fishermen depend. The vessels cannot fish in the Gulf of St. Lawrence which will allow Canada to deny French fishing companies based on St. Pierre-Miquelon the right to use freezer ships in the Gulf.

2. It is important to distinguish the controlling factor; it is not the number of registered fishermen, but the number of groundfish licences issued. The 21,000 figure represents the number of *registered fishermen* which does not equate to the number of groundfish licences. In 1984, there were 27,618 fishermen registered in Newfoundland (13,457 full-time and 14,161 part-time), but there were only 9,994 groundfish licences issued. In 1983, there were 27,997 fishermen registered (13,450 full-time and 14,574 part-time but only 10,227 groundfish licences issued. As a result of passage of the Atlantic Fisheries Regulations 1985, the "personal fishing licence" is now called a "fishermen's registration" to avoid confusion with the term "licence". (Information from the Department of Fisheries and Oceans, Ottawa)

3. The number of registered fishermen was also large in 1964, for example, when the number of fishermen was 22,615 (ECC Table 6-2). In the early 1970's the fish stocks were in poor shape as a result of over-fishing by foreign distant-water fleets so many fishermen left the fishery for employment elsewhere.

A portion of the early increase in the number of Personal Fishing Licences (i.e. registrations) was due not to an increase in the actual number of fishermen, but to an increase in the number holding Personal Fishing Licences. Not everyone obtained one when they were first introduced in 1975 and it took a number of years before everyone realized that they needed one. Some people just took them out for insurance purposes because they saw more restrictions coming. Therefore, the number of Personal Fishing Licences does not accurately measure fishing effort or participation in the fishery. Finally the squid bonanza in 1979 when squid were abundant encouraged many fishermen to enter the fishery, and many subsequently withdrew (Department of Fisheries and Oceans).

4. The Department of Fisheries and Oceans reports main estimates for 1985/86 anticipate a federal contribution of $195 million (net of premiums) or about 20% of the gross landed value when reported that way.

5. An audit of the observer program was undertaken which concluded that "the systems the Department has in place do not totally eliminate the possibility of observers taking bribes (but) the Department does, however, have checks which would identify situations where significant irregularities may be occurring."

6. A November 15th, 1984 Government of Canada press release names William James, Chairman and C.E.O., Falconbridge Ltd. (Toronto), Frank Stronach, Chairman and C.E.O., Magna Inc. (Downsview), J. Howard Hawke, Chairman and C.E.O., Bache Securities Inc. (Toronto), Paul Desmarais, Chairman, Power Corporation (Montreal), James J.L. Greene, Q.C., partner in the law firm O'Dea Greene, (St. John's), Andrew Crosbie, Chairman of Crosbie Offshore Services Ltd. (St. John's), Albert Hickman, President of Hickman Motors Ltd. (St. John's); Henry Collingwood, Chairman and C.E.O. of Baine Johnston & Co. Ltd. (St. John's), Anthony A. Brait, President and C.E.O. of Newfoundland Telephone Co. (St. John's), and Roger Pike, President and C.E.O. of the Pike Group (St. John's), and Robert Gimlin, Chairman and C.E.O. of Abitibi-Price (Toronto).

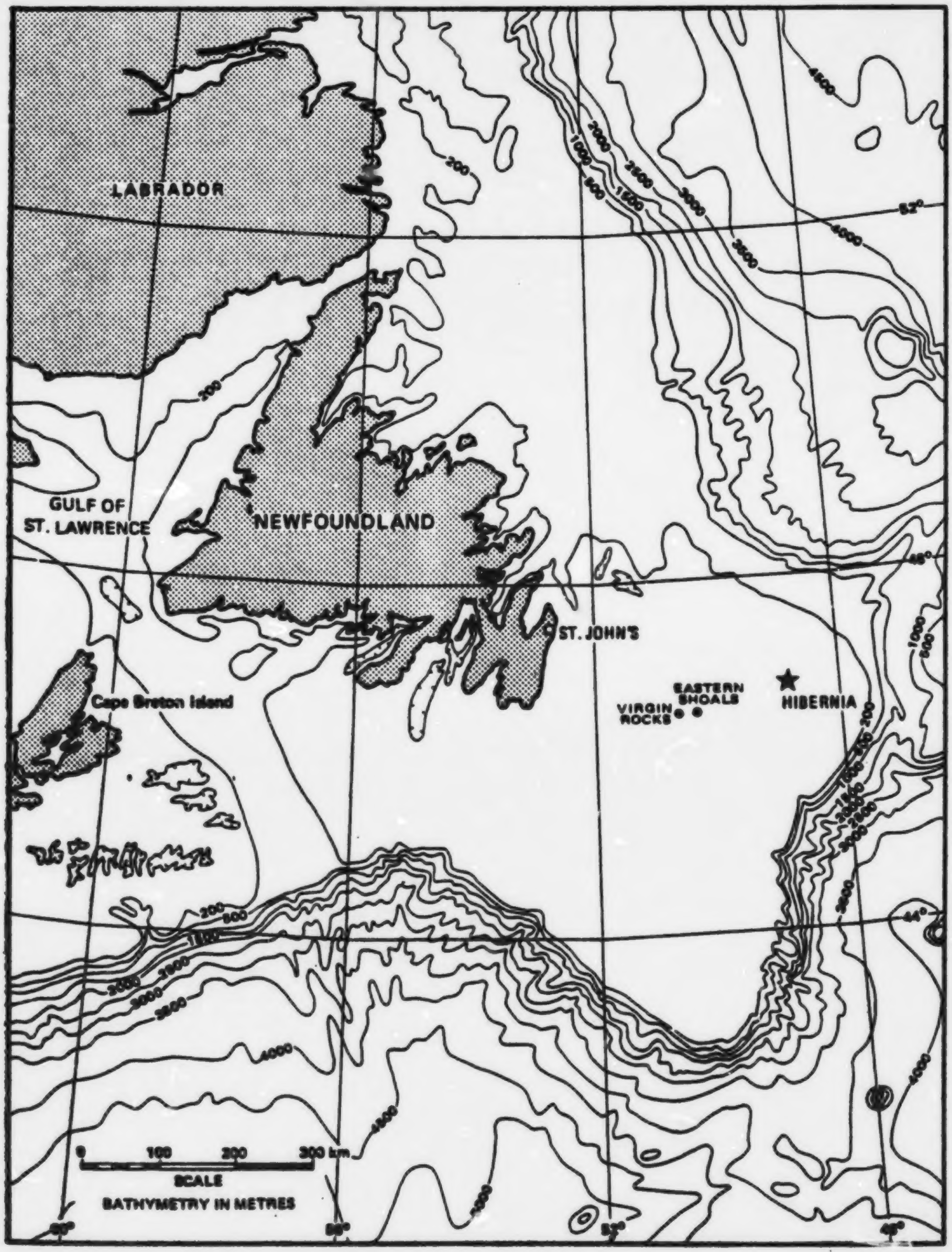
# 8

# HIBERNIA

# A POLITICAL ECONOMIC ANALYSIS OF THE ISSUES FOR NEGOTIATION

This work was partly funded by Energy, Mines and Resources Canada under its Research Agreements Program for Universities

Figure 1.1-1
Location of Hibernia Field


LABRADOR
GULF OF
ST. LAWRENCE
NEWFOUNDLAND
ST. JOHN'S
Cape Breton Island
EASTERN
SHOALS
VIRGIN
ROCKS
HIBERNIA
200
500
1000
1500
2000
2500
3000
3500
4000
4500
52°
48°
44°
60°
56°
52°
48°
0
100
200
300 km
SCALE
BATHYMETRY IN METRES

# HIBERNIA*

Hibernia, Canada's first offshore oil megaproject is scheduled to begin production 200 miles east of St. John's in 1992. It is important to the Newfoundland economy, not only for the direct employment and government revenues it might create, but because it may have an important effect on the urban structure of the Newfoundland economy, on labour force skills, and on productivity (see chapter 2 and Appendix D). The current chapter makes use of social cash flow analysis to portray the historical evolution of official views of the economic viability of the Hibernia project as changes in knowledge and political pressures have evolved since mid 1980. Then some important observations on the characteristics of certain fiscal regimes are introduced. The Hibernia regime is crucial for Canadian offshore Oil and Gas Policy because it sets a precedent for all offshore projects to follow. The author demonstrates that certain regimes like the cash flow tax and and the current Frontier Regime (announced in October 1985) are more economically resilient than traditional royalties, but that these two regimes have a dramatic difference in the way they influence the riskiness of projects. Whereas most analysts concentrate on evaluating possible outcomes under different scenarios, it is important to view future costs and revenues as random variables encompassing all possible scenarios in the form of probability distributions, and to devise fiscal regimes that can be assured of reducing the variance (riskiness) of private net present value while ensuring that mean net present value not be driven negative. The elementary cash flow tax (Boadway, Bruce and Mintz 1984) has excellent risk reducing characteristics, whereas the current Frontier Regime does not; yet both yield the same present value for governments on successful projects. Failure to introduce a profit-oriented tax in the 1985 federal budget (as was suggested in the Western Accord) has left the Federal Government very little option in the current negotiations except to return to depletions allowances and other traditional tax concessions that have poorer risk-reducing characteristics and which may set a poor precedent for the fiscal management of future offshore petroleum regimes.

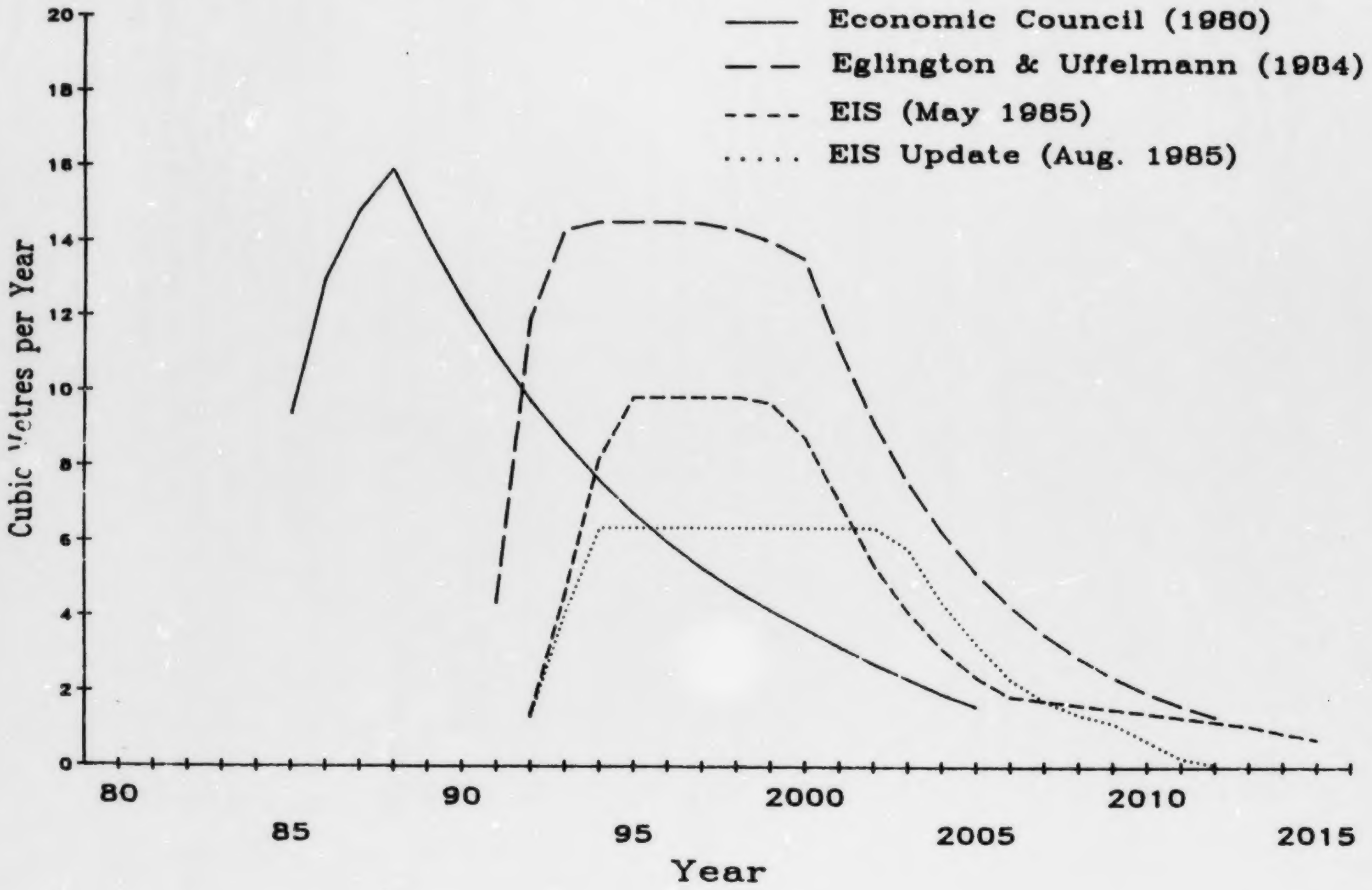
## Changes in the Official Perceptions of the Value of Hibernia

Official perceptions of the most likely production profile for Hibernia have changed rather dramatically since the field was discovered in 1979 (Chart 8-1, Table 8-1 and Appendix G)[1]. The latest official view from the Newfoundland Petroleum Directorate (November 12th, 1985) is presented in Appendix G.

The Economic Council's view (1980) was based upon data provided by the Newfoundland and Labrador Petroleum Directorate, which in turn was related to a study it had commissioned by Energy Projects Newfoundland Ltd., and Cooke Offshore Consultants Ltd. (1980). A more detailed analysis by Jonathan Wilby (1981) was based on the same consultant's document. At that time, the most probable development profile involved the use of a floating production platform whose capital costs were believed to be in the order of $3 billion dollars, by comparison with up to $8 billion required for a gravity base system of production, (both figures in undiscounted 1980 dollars as spent).

CHART 8-1

# EVOLUTION OF EXPECTED PRODUCTION PROFILE
## HIBERNIA



## Table 8-1 Hibernia's Economic Parameters: Changes in Official Perceptions

| | Economic Council Floating Platform | Wilby Floating Platform | Eglinton & Uffelmann Gravity Base | EIS Gravity Base System | EIS Update Gravity Base System |
|---|---|---|---|---|---|
| Development Start Date | 1979 | 1980 | 1985 | 1985 | 1985 |
| Production Start Date | 1985 | 1985 | 1991 | 1992 | 1992 |
| Years of Production | 21 | 22 | 25 | 15 | 21 |
| **Cumulative Production (Reserves)** | | | | | |
| Millions cubic metres | 160 | 155 | 190 | 96 | 83 |
| Millions of barrels | 1000 | 984 | 1200 | 600 | 525 |
| **Peak Production Rates** | | | | | |
| Millions of $m^3$/y | 15.9 | 17.4 | 14.5 | 9.86 | 6.38 |
| Thousands of bbls/d | 275 | 300 | 250 | 170 | 110 |
| **Undiscounted Costs** | | | | | |
| Capital Cost ($millions,1984$) | 4300 | 4305 | 5886 | 5093 | 4728[1] |
| Annual Operating Cost ($million/yr, $1984) | | 250 | 196 | 465 | 397.5[1] |
| **Levelized Real Cost** | | | | | |
| @ 10%, $1984/$m^3$ | | 82 | 90 | 192 | 398 |
| @ 10%, $1984/bbl | | 13 | 14.25 | 30.50 | 36.50 |
| **Discounted Present Value @ $220/$m^3$ ($35/bbl)** | | | | | |
| billions of 1984$ at 1980 | | 8.2 | 4.63 | 0.50 | -.14 |
| billions of 1984$ at 1985 | | | 7.5 | 0.80 | -.22 |

Source: Computations by L. W. Copithorne and B. Schellenberg, roughly extrapolating incomplete data in ECC Newfoundland (1980), Wilby (1981), Eglington & Uffelmann (1983), Environmental Impact Statement (1985)

[1] Capital costs for the EIS Update scenario were the same as in the EIS, except for a 25% reduction in development drilling of $71.56 million/yr in 1991-1994 because of 25% fewer wells, and $110 million less capital expense in 1991-92 because the fourth shuttle tanker would not be required. For these reasons, operating costs were reduced by $30 and $37.5 million per year respectively for reduced tanker and well workover expenses.

As is common with oil pools, it was initially assumed that drilling would proceed at a high rate during the early phases of the project so that peak production could be achieved early, in order to produce a favourable cash flow profile with most of the revenues coming as early as practicable. Converting the costs to 1984 constant dollars and valuing the 160 million cubic metres of cumulative production at a *real* price of $\$220/m^3$ (\$35/bbl), Hibernia would have had a real 1980 present value of about \$8.2 billion, using a 10 per cent real discount rate. That is, the resource would generate about \$8.2 billion in economic rent at today's world oil prices. In 1980, the provincial government officially contemplated capital costs in the order of \$3 billion and rents of \$10 to \$41 billion in 1980 dollars (*Managing All our Resources* 1980).

**The delay needed to obtain a political resolution involved a cost.** One has to be cautious in such a statement, because it can be argued that the delay was actually needed to give Mobil additional time to explore the field and improve the technology it will use. Nevertheless some of the seven year delay of production startup from 1985 to 1992 has to be associated with the court cases and political changes which culminated in the Atlantic Accord of February 11th, 1985, by which it became possible for the federal and provincial governments to proceed with the establishment of the Canada-Newfoundland Offshore Petroleum Board and to begin cooperative planning for the development of Hibernia.

To say that there is a cost in delaying an investment project amounts to nothing more sophisticated than saying that postponing a cash flow for seven years reduces its net present value. For example, if one takes a 10 per cent discount rate, a \$35/bbl oil price and uses the most economic (floating platform) cost estimates and project timing as indicated in the first published study (Wilby 1981) and discounts cash flows back to 1980 when a development decision could have been made, then one calculates that the delay reduced the 1980 present value of the project by some \$4.2 billion from \$8.2 billion to \$4 billion (1984 constant dollars).

In principle, this is one way to measure the cost of obtaining political agreement, but that would be an overstatement: official estimates of the cost of floating platform technology have now increased, while the estimates of the cost of fixed platform technology have declined. Some valuable knowledge may have been gained by waiting. The Ocean Ranger Disaster also suggested that floating platform technology may be more risky than fixed platform technology--whatever else happens, the gravity base platform cannot sink.

In the course of the delay, the changes in fiscal regimes and expected production technology certainly changed the amount of economic benefits that will accrue to Newfoundland. Not only does the gravity base technology create more jobs in Newfoundland; the federal government agreed to much more generous terms in the Atlantic Accord of 1985 than were proposed in the National Energy Program of 1980. Thus, while the cost of obtaining political agreement may have been in excess of a billion dollars for Canada as a whole, the wait has been well worth it from Newfoundland's point of view.

**Reserve estimates have declined.** The officially estimated volume of recoverable oil reserves has moved from a range of 80 - 240 million cubic meters (ECC 1979) to 295 cubic meters (Newfoundland Energy Minister Leo Barry's 1.85 billion barrel announcement in the summer of 1980) to 83 million cubic metres in the EIS Update (August, 1985). The higher numbers (Leo Barry, Eglington & Ufflemann, Wilby) were supplied by the Newfoundland and Labrador Petroleum Directorate. Successively lower numbers have been provided by Mobil Oil, the operator of the project.

**Peak production rates have declined**, reducing the present value of the the cash flow profile, even after allowance is made for the reduced reserves expected. Clearly the proposed production profile of the field has successively been worsened as the proposed production rates have been lowered and reserves reduced. The August Environmental Impact Statement Update both reduced the peak production rate and extended production longer through time (Chart 8-1). Why has the peak production rate been reduced from over 300 thousand barrels per day to closer to 100 thousand barrels per day? This curtailment of production in the most productive years of the field sharply reduces the economic rent generated by the field. The economic rent is being eaten up by the interest charges on capital costs that might conceivably be recovered earlier, if the production profile were to follow a more conventional path.

**Fixed platform technology is officially declared most economic.** The most startling change in official perceptions is the declaration by Mobil Oil Company Ltd. that the undiscounted 1984 constant dollar capital costs of the fixed production system have declined from something closer to $10 billion in 1980 to $4.77 billion now, while the capital costs of the floating production system have risen from something like $4.3 billion in 1980 to $5.476 billion now. (It was consultants, and not Mobil that made the original estimates, on the basis of much less analysis.)

Engineers at COGLA warn, however, that as other oilfields are developed near Hibernia, one cannot assume that the Hibernia technology will be cloned. They suggest that building gravity base systems for the other smaller finds nearby will be out of the question.

Eglington and Uffelmann obtained their data from the Newfoundland and Labrador Petroleum Directorate, and reported only information for the fixed gravity base production system favoured by the provincial government. They remark that the Ocean Ranger Disaster made the gravity base system the most likely development, implying that the gravity base system may be perceived as safer.

**Operating costs have increased substantially.** The annual costs of some $196 million per year reported by Eglington and Ufflemann were obtained from the Newfoundland and Labrador Petroleum Directorate. The $465 million per year costs are reported by Mobil itself. The perceived operating costs have more than doubled, while the total output is more than halved.

**The levelized cost of producing the oil has tripled**, from about $13-14 per barrel as calculated by Wilby and Eglington and Ufflemann, based on data supplied by the Newfoundland and Labrador Petroleum Directorate, to about $36 per barrel, based upon data in the EIS Update. What is especially perplexing is the 20 per cent increase in levelized cost implied in Mobil's EIS Update of August, 1985 by comparison with its own figures reported in the EIS statement a few weeks earlier. At $36.50/bbl, the new figures coincidentally rose to approximate the world oil price as it existed at the time the update was released. Subsequent declines in the world oil price now leave the official costs for Hibernia above the economic break-even level, even in the presence of zero royalties.

What requires explanation is why a profit-maximizing organization would elect for a change in its proposed cash flow that reduces the peak production rate from 170 thousand barrels per day to 110 thousand barrels per day. The declared cost saving in 25 percent fewer development wells and one less shuttle tanker cannot possibly explain why the company would so distort the production profile as to raise its levelized costs by 20%.[2]

**Fiscal regimes currently under apparent consideration are not novel.** Analysts in the relevant government departments typically start with reasonable assumptions about cash flows and will then apply different fiscal measures that are of interest to the political negotiators. To date the ideas under consideration seem to include the traditional negotiating issues, not excluding rapid write-off rates for depreciation, depletion allowances, super depletion allowances, turning the 25% resource allowance on and off, immediate expensing of capital expenditures, changes in corporate income tax rates, investment tax credits, and different basic royalty rates. The Progressive Incremental Royalty is apparently less likely to be considered. Two models that might be given serious consideration are the Cold Lake Fiscal Regime for oil sands (which was extented to all Canada Lands in October 1985), and the Enhanced Oil Recovery Regimes in Alberta. No one seems to be planning to run simulations on the old Newfoundland regulations. There is no immediate evidence that public servants are gearing up to run simulations on the more exotic types of flexible royalty and taxation regimes suggested in the literature (Copithorne, MacFadyen and Bell, 1985).

**Who is going to pick up the cost of Hibernia?** The currently proposed cash flow profile is so unfavourable that the largest oil find in Canadian history will apparently become a serious liability to the Canadian taxpayer. At $35 per barrel, the field is apparently headed for a net loss of a quarter of a billion dollars, without contributing anything by way of royalties. The Canadian minister of Energy Mines and Resources has declared that Hibernia will proceed primarily for reasons of providing an engine for economic growth (and thereby making it a target for aggressive pricing by suppliers and aggressive wage negotiations by organized labour).

**Do the tax concessions involve a certain extra-territoriality?** It is important to realize that Hibernia is not a stand-alone project. If each company in the Hibernia consortium were allowed flow-through tax concessions that enabled them to accept the losses inherent in the current undesirable cash flow profile for Hibernia, would that not also reduce the income tax collected by Alberta from these same companies on the income they have generated in Alberta? Is it conceivable that policy constraints imposed by the Newfoundland Government will have their financial incidence in other provinces, as well as upon the federal government?

The current fiscal regime from which negotiations must take place involves:

- 7% investment tax credit at sea, 20% on land
- 30% writeoff on capital assets
- 30% writeoff on development expenditures
- 100 % writeoff of exploration expenditures
- 0% earned depletion offshore currently
- 33 1/3 % depletion currently applies to some Enhanced Oil Recovery and oil sands projects. (Rates of earned depletion of 33 1/3 %, plus 66 2/3 % super depletion on well expenditures in excess of $5 million--coupled with 100% write-off of exploration expenditures have applied in past.)
- 6% - 20% writeoff on transmission pipelines
- 30% writeoff on gathering pipelines
- 46% federal corporation tax rate with10% provincial abatement
- 10% corporation tax rate in Alberta
- 16% corporation tax rate in Newfoundland

Negotiations for fiscal relief will probably involve concessions with respect to these parameters. Relief has also been asked from sales tax and customs duties applicable on materials used in the project's construction. In addition there may be debates about the definitions of "exploration" and "development". Currently, wells that do not produce in the first 12 months after drilling are considered as exploration and are expensed at 100%. Explicit price guarantees above world levels and explicit subsidies are less popular with both companies and governments because they are politically obvious and open to political attack.

**It is a little difficult to interpret some of the most recent data** reported for Hibernia, including the *Environmental Impact Statement* of May 1985 (EIS), and the *EIS Update* in which the decision to use the Gravity Base System was announced. Before some production history is established, there is inevitably a high degree of uncertainty about the ultimate economic performance of oil reservoirs, and it is normal for there to be considerable difference of opinion among geologists and engineers about the ultimate economic performance of the field, and the costs of developing it. In the current situation, there has never been a gravity base system built in Newfoundland, and there has never been a system anywhere in the world which has been put in place to produce in the presence of icebergs.

Apart from the normal uncertainty involved in evaluating the economic potential of an oilfield, the current political-economic environment contains a set of economic incentives that make it risky for a vested interest to present a complete and totally unbiased set of data, (if indeed one could find a criterion by which the "bias" in official opinion could be measured). Because there has never been a neutral generic fiscal regime defined and agreed to for oil and gas production on Canada Lands that could apply to Hibernia, it is now necessary for the fiscal regime to be negotiated among the participating companies, the provincial government and the federal government. Each party may damage its own bargaining position by the way it reports data. If the company reports optimistic estimates of reserves and reservoir productivity, it is implicitly encouraging both governments to impose heavier royalty rates. Experience with the National Energy Program testifies that optimism might also blind the governments to the need for fiscal regimes that are sufficiently flexible in accomodating disappointing economic performance.

Governments also have their own objectives in capturing economic benefits for their respective jurisdictions. It is no secret that the government of Newfoundland has favoured a gravity base system for the development of Hibernia from the beginning; the gravity base system requires thousands of man years of local construction labour--jobs that can, to a certain degree, be directed to various parts of the island so that several electoral districts in Newfoundland can share in the economic activity, as is the declared policy of the current government *(Managing all Our Resources, 1980).* The gravity base system forces a stronger commitment upon the participating companies; a floating production system which has higher operating costs and lower capital costs explicitly allows the companies flexibility, making it possible to shut down and move elsewhere--perhaps to the vicinity of another province--if Hibernia turns out to be uneconomic.

In the early days of the project, the provincial government was also on record as favouring a pipeline to take all the oil directly from Hibernia to the Avalon Peninsula, coupled with a legal requirement that all of the oil in Hibernia be landed on Newfoundland before being shipped to a refinery. This policy was felt necessary to ensure that at least some of the oil was brought to Newfoundland, so that some local jobs in petroleum refining and downstream processing could be created--perhaps at the mothballed Come-by-Chance Refinery. There was discussion that the rate of production of Hibernia be restrained to match the processing capacity of Come-by-Chance so as to prevent the loss of some of the oil to refineries in other parts of Canada or the world. In 1979 and 1980 there was grave concern that Hibernia could be developed almost entirely with offshore labour, that the floating production system be almost entirely manufactured outside of Newfoundland before being floated into place at Hibernia, and that all of the oil be transported to refineries elsewhere in the world. There was grave concern that the federal government would capture the lion's share of governmental revenues and that Newfoundland would end up with almost nothing--almost none of the jobs and almost none of the revenues, and that its labour force would gain next to nothing from the experience.

One has to remember Newfoundland's long unhappy history of mega project investments in hydro-electricity, iron ore, Labrador Linerboard, Come-By-Chance, and others (Econonomic Council 1980) to appreciate Newfoundlanders' fears about losing the benefits of the oil. No political group has been able to find a way to allow Newfoundland to recoup any of the unexpected windfall in hydro-electric rents at Churchill Falls which run into the hundreds of millions of dollars each year. There is no assurance that the same thing could not happen again if Newfoundland were to agree to take a cash settlement instead of the oil. And if Newfoundland needed any extra warning, the National Energy Program made it very explicit that the Government of Canada considered Hibernia to be a Canadian resource with most of the revenues to go to Canada, not to the province.

Although a pipeline to the island from Hibernia may not be techically feasible, the mothballed Come-By-Chance refinery is still there. The current provincial government has made it explicit in *Managing All our Resources* that it wants direct ownership and control over the natural resources and that it will make use of direct controls on the exploitation of those resources to ensure that the jobs and the benefits go to Newfoundlanders. There is no intention to exploit those natural resources for the purpose of generating maximum economic rents for Canada as a whole.

Is it posssible that the Newfoundland government might publicly or privately impose the condition that Hibernia be developed by gravity base system, even if that method were not the most economice route to follow? Is it possible that the Newfoundland government might publicly or privately impose the new condition that the maximum daily production rate be restrained to 110 thousand barrels per day? What is the currently planned destination for the oil that will be produced? Come-by-Chance now has the capacity to process virtually the entire planned production of Hibernia, if the refinery were reactiviated.

In this political environment, private developers will face some difficulties if they make development proposals that fly in the face of political reality. Common sense suggests that even the reporting the costs of alternative development scenarios could cause unnecessary trouble for company management. If the provincial government has an obvious, understandable and profound commitment to one particular development technology, does it make sense to report costs in the Environmental Impact Statement which would make alternative scenarios look more attractive to the nation as a whole? Does an oil company need to be told explicitly what is wanted, or can it come to those conclusions by itself? If a company chooses a technology and a production profile that is pleasing to political interests, is it not reasonable for the company to request concessions as necessary to allow it to proceed without undue damage to the profitability of its investment? If economic rents are something that belong to governments, why should a company be concerned about how government expends those rents? Unfortunately, there may be no way to directly answer these questions, but we think they are substantive matters that should not be overlooked in an honest economic analysis of Hibernia.

**Private Comments Received** from a number of government officials in Newfoundland in response to the above questions dismiss the prospect of using the Come-By-Chance refinery, but the exact destination of Hibernia oil is not yet clear. Federal officials point out, on the other hand, that under a federal-provincial agreement for sharing income tax revenues among provinces, the deemed point of sale is vital. If the oil were landed at Come-By-Chance and deemed to be sold there, Newfoundland would qualify for the provincial share of the companies' income tax payments. If the deemed point of sale were to be Port Hawkesbury or Montreal, the provincial income tax could go to Nova Scotia or Quebec. This issue must be resolved in the current negotiations.

A number of officials seemed surprised that the August EIS Update cash flow profile involving 9 years of production at 110,000 bbls per day implied negative economic rent at the current time, but they confirm that the production profile reported here conforms with their data. They doubt that the ultimate production levels will be that low. Current design specifications call for daily production capacity on the Gravity Base System of 150,000 bbls per day.

There are plausible reasons for the historic changes in the perceptions of Hibernia's capital costs. Until fairly recently, the developers indicated preference for floating platform technology in their discussions with government officials. However, if one assumes that the floating production system has to be built in Canada which currently has no shipyard large enough to accomodate it, and if one builds in the extra costs for learning by doing, it is conceivable that the estimates of the costs of the floating system could rise as they have done. It is conceivable that a floating production system built in Norway, for example, might be cheaper than one built in Canada, but the Environmental Impact Statement does not contain such estimates.

Both federal and provincial officials point out that the proposed floating sytem got larger as design plans developed, partly to accomodate the large amount of compressor capacity that will be needed to reinject natural gas into the reservoir, and partly for ice-strengthening.

Mobil now has experience with three gravity base systems in the North Sea and more information from ice studies has been received since 1980. In the light of this experience, the company designed a smaller Gravity Base System with a smaller daily production capacity and smaller topsides than was contemplated in 1980. Nevertheless most engineers would prefer a floating point system because of its greater flexibility and the possibility of redeployment.

While doubting that production levels need to be held as low as 110,000 barrels, reservoir engineers note that a flattened production profile (by comparison with the peaked profiles originally suggested for Hibernia) is not unreasonable. Doubling the number of wells will less than double the daily production rate as nearby wells begin to interfere with each other's performance. Fewer wells involve less interference with each other and can maintain production levels longer. (In principle, a large, well-connected oil pool can be drained by a single well producing at a constant rate for an extremely long period.) There is therefore a tradeoff between the cost of drilling more wells to get faster production and the economic benefits for a larger cash flow earlier in time. (Our own analysis suggests, however, that the August EIS Update was an economically less desirable one than that contained in the May EIS.)

Government officials had some difficulty explaining why operating costs have more than doubled while total output is more than halved. They note that the oil in the Avalon reservoir in particular may be difficulty to produce; it has a poor pour point, is very waxy and may require a lot of well workovers.

Officials confirm that there has historically existed a wide divergence of official opinion about oil reserves and that there are some vested interests at stake. (See hypothetical illustration in Table 8-2. The author thanks the Newfoundland Petroleum Directorate for providing its current official view. See Appendix G). They also point out that the sequence of wells drilled has demonstrated the highly faulted Hibernia and Avalon reservoirs to more complex than previously thought. Because the second well, O35, hit a localized "sweet spot" in the Avalon formation, it gave everyone a much more optimistic impression of the capability of the Avalon reservoir than can be justified by evidence obtained from more recent stepout wells. Attention is now concentrated on the Hibernia reservoir, which is a much more permeable sandstone, where a gas cap may be present (whereas the Avalon contains less gas (Appendix G) and may not have a gas cap), and where the grade of oil is better. Whereas there is still a great deal of professional difference of opinion on the capabilities of the Avalon reservoir, there is much closer to a consensus on capabilities of the Hibernia reservoir.

## The Difficulty in Distinguishing Engineering and Geologic Fact From Political Reality

It is important to realize that there is so much uncertainty in the development of an oil pool that well-informed experts can disagree widely about what is technically and economically feasible. Their differences of opinion can arise partly from different assumptions about the future wellhead price of oil, but also about the number of wells needed, and about the ultimate performance of the reservoir itself.

The oil industry is typically optimistic about what can be found and produced; exploration programs cannot be launched if investors insist on conservatism. But the industry is prudent and conservative in reporting "proved reserves", "proved and probable reserves" and "proved, probable and possible" reserves; no company president wants to tell his bankers he has had to cut back estimates of the company's reserves.

Reservoir engineers typically estimate a particular recovery rate and a particular volume of original oil in place (OOIP), based on knowledge obtained from well logs, seismic surveys and other sources. "Proved reserves" are the volumes of oil known with a high degree of certainty to be recoverable under current economic and technical conditions. There is room for argument because "a high degree of certainty" is not precise. Engineers can only speak with much certainty about the nature of the reservoir in the near vicinity of the ten wells that have already been drilled.

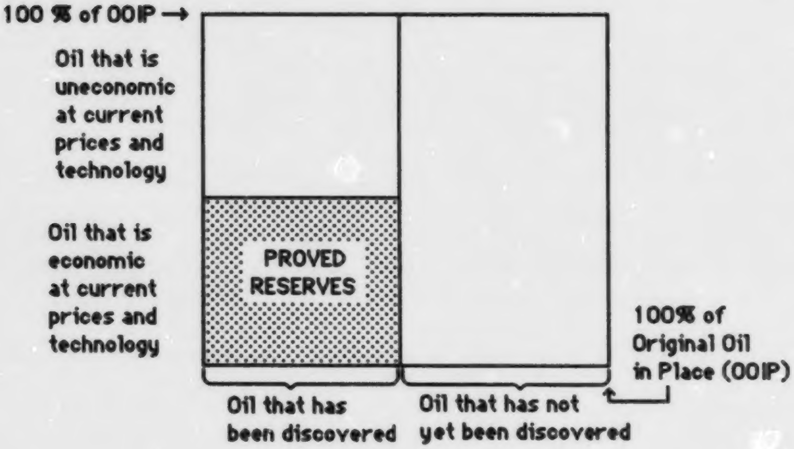
"Proved reserves" are those that are in "ready inventory". They are the numbers of greatest interest to the oil company's bankers. They are by no means the long run expected oil production of the region. In Figure 8-1 the total volume of original oil in place in a region can be represented along two axes--percentage of the oil that has been "discovered" or located with certainty, and the percentage that is currently economic. As time passes and more wells are drilled and as wellhead oil prices and technology change, both boundaries move and the total volume of recoverable oil (proved reserves) from the region will change.

"Proved and Probable" reserves are perhaps a more accurate statement of what the company thinks it is really planning to produce.

The rate of production from a reservoir is governed by many factors--permeability, viscosity, dominant energy drives within the reservoir, and many others. But there is still great scope for altering the rate of production from the reservoir through infill drilling, different pressure maintenance techniques, and enhanced oil recovery techniques. The presence of substantial faulting at Hibernia requires that more wells be drilled to tap disconnected parts of the reservoir than would otherwise be required. All of these factors--characteristics of the reservoir, the kind of engineering development used, and the wellhead price of oil--affect the ultimate rate of recovery from the reservoir, as well as the particular time profile of output by which that total volume is recovered.

COGLA has commissioned a reservoir engineering study for Hibernia and it is in possession of viewpoints from different companies and governments. These data are not readily available to the public. Discussions with engineers, geologists and professors with some knowledge of petroleum economics suggest that, simplisticly speaking, a typical company with knowledge of the Hibernia field might calculate "proved", "proved and probable" and "proved, probable and possible" oil reserves by using hypothetical recovery

FIGURE 8-1


100 % of OOIP →
Oil that is uneconomic at current prices and technology
Oil that is economic at current prices and technology
PROVED RESERVES
100% of Original Oil in Place (OOIP)
Oil that has been discovered
Oil that has not yet been discovered

rates of 5%, 10% and 20% for the less porous brown Avalon formation where the viscosity of oil is higher, and hypothetical recovery rates of 10%, 30% and 40% for the more porous grey Hibernia sandstone formation where the grade of oil is lighter and less viscous (Table 8-2). Assuming only partial development of the Avalon formation (as is Mobil's current plan announced August, 1985), opinion about the amount of original oil in place (OOIP) could be in the order of 600 million barrels in the immediate vicinity of the ten wells drilled (the "proved" reserves) and about 2.2 to 2.3 billion barrels in both reservoirs, based on seismic information about the entire reservoir. Combining these assumptions, one can generate realistic hypothetical numbers to show how an operating company might see the reservoir. (For the latest official provincial data see Appendix G.)

The author has devised the hypothetical numbers in Table 8-2 so as to come to 520 million barrels of "proved and probable" reserves (450 million for the Hibernia formation and 70 million for the Avalon formation) approximating the reserves officially declared by Mobil in its August EIS Update. But it is extremely important to realize that the same company may be looking at currently estimated proved reserves of something like 40-50 million barrels of proved reserves, while it may ultimately recover something like 700-800 million barrels (46 and 760 suggested in Table 8-2).

While geologists' estimates of proved reserves are understandably conservative (since they are based on conservative and prudent assumptions), governments can be expected to make a correction for this known conservatism on the parts of the companies. Therefore one might expect some governments to assume higher recovery rates--perhaps 10 percentage points higher, and that they would tend to use the "proven, probable and possible" amounts of original oil in place as their basic guide, even for the "proved" category. Hence, when one considers the possibility of full development of the Avalon reservoir, some government might have a view that was 50% more optimistic than the company in considering what is "proved and probable". Furthermore, there may be reasons for provincial and federal governments to interpret the same data differently.

## Table 8-2

## Uncertainty About Hibernia and Avalon Oil Reserves: An Illustrative Example Based on Realistic Assumptions[1]

(millions of barrels)

| | Proved | | | Proved & Probable | | | Proved, Probable & Possible | | |
|---|---|---|---|---|---|---|---|---|---|
| | OOIP | RF(%) | Reserves | OOIP | RF(%) | Reserves | OOIP | RF(%) | Reserves |
| **One Company's View** | | | | | | | | | |
| Avalon | 280 | 5 | 14 | 700 | 10 | 70 | 800 | 20 | 160 |
| Hibernia | 320 | 10 | 32 | 1500 | 30 | 450 | 1500 | 40 | 600 |
| Total | 600 | | 46 | 2200 | | 520 | 2300 | | 760 |
| **Contrasting Government and Company Views** | | | | | | | | | |
| Hibernia | | | | | | | | | |
| Govt | 1500 | 35 | 525 | 1500 | 40 | 600 | 1500 | 50 | 750 |
| Co. view | 320 | 10 | 32 | 1500 | 30 | 450 | 1500 | 40 | 600 |
| Avalon Full Field | | | | | | | | | |
| Govt | 1200 | 10 | 120 | 1500 | 20 | 300 | 2000 | 25 | 500 |
| Co. View | 750 | 4 | 30 | 1500 | 10 | 150 | 2000 | 15 | 300 |
| Hibernia Plus Avalon | | | | | | | | | |
| Govt. | 2700 | | 645 | 3000 | | 900 | 3500 | | 1250 |
| Co. View | 1070 | | 62 | 3000 | | 600 | 3500 | | 900 |
| **Contrasting Views Among Knowledgeable Companies** | | | | | | | | | |
| Recovery Factors | | 10-25 % | | | 27-41 % | | | | |
| Reserves | | | 150-450 | | | 400-560 | | | 600-950 |

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Source: Author's own illustrative example constructed from realistic assumptions, following discussion with knowledgeable engineers and geologists.

[1] OOIP refers to the volume of "original oil in place". RF refers to "recovery factor" expressed as a percentage of the original oil in place.

Even among companies who have access to the same information, opinion about recovery rates can vary over a range of 10-25% in the "proved" category, and from less than 30% to over 40% in the "proved, and probable" category. Hence, company opinion can range all the way from something like 150 million barrels of "proved" reserves to 950 million barrels that might ultimately be recoverable with current technology and oil prices.

Without going into as much detail about the costs of constructing gravity base and floating production systems, it is reasonable to assume that there would be considerable uncertainty about what it would cost to build these for Hibernia.

## What One Cannot Safely Conclude:

- One cannot safely conclude that the ultimate total of recoverable reserves will be as small as Mobil currently reports. While the company might ultimately recover even less oil, (Eglington & Uffelmann (DP No. 235, 1983) have demonstrated that in reporting oil reserves, it is conventional for industry to be conservative.

- One cannot safely conclude that the fixed gravity base technology is the cheapest. There may be a price to be paid to develop the production systems in Canada.

- One cannot safely conclude that operating costs will be as large as Mobil currently suggests. While they may be even larger, it is reasonable to expect the company to be conservative.

- One cannot safely conclude that the currently proposed production profile is the most economic one.

- One cannot safely conclude that there are no latent economic rents in Hibernia at current prices. It seems that the recoverable reserves could still range from 450 to 950 million barrels, that the technology applied may not be least cost, and that actual operating costs could turn out to be different from current assumptions. If economic rents are present, they could conceivably be in the order of billions of dollars (Table 8-1).

- One cannot safely conclude that governments and companies will allow the latent economic rents to be realized. If Hibernia were to produce over 300 thousand barrels per day, Newfoundland could not possibly process all the oil; over two-thirds of it would have to go elsewhere during peak production, thereby weakening Newfoundland's chances of developing an indigenous refining industry and possibly weakening her claim to the provincial share of corporation income tax to be generated at Hibernia. Hence one should not be surprised if there were political pressure to hold rates of production to the neighbourhood of 100 thousand barrels per day, with very unfavourable effects on the cash flow and economic rents generated (Chart 8-1, and Table 8-1).

If rents are explicitly received, Newfoundland may be required, by current and future governments in other parts of Canada, to share them, as Alberta's experience can testify. If costs can be made to rise high enough to exhaust the economic rents, all the benefits of the resource can be retained--after a fashion--in Newfoundland.

Current EIS plans call for most of the material inputs to the oil industry to take the round about overland tour from the extreme southwest corner of the island to be returned to tidewater again at St. John's, Argentia and Arnolds Cove-Adams Head. This process is enforced by government policy that requires that the Gulf Subsidy and the loss on the narrow guage railroad be picked up the federal government and Canadian National Railways, respectively. Prior to the last Newfoundland election, a ruling by the Canadian Transport Commission to require higher freight rates on the railroad was overruled by the federal cabinet. The system of subsidies and the provincial government's desire to route traffic across the island of Newfoundland to create economic spinoffs for many people in Newfoundland is something that the oil companies must take into account. As long as the greater social costs of this transportation system are borne by the economic rents and federal consolidated revenue, the companies may find the two or three days reduced travel time advantageous (by road as compared with the less frequent weekly trips by sea). At least one government official, has cautioned the author, however, to interpret the Environmental Impact Statement as the maximum impact that could take place. He suggests that the actual procurement pattern may involve a large amount of shipment of GBS Topsides and other traffic by sea, that the statements in the EIS should not be interpreted as a prescription of what is intented to happen, but only as a statement of the maximum possible impact.

- One cannot safely conclude that the jobs created by Hibernia will reduce the numbers of persons unemployed, or the net burden of unemployment insurance payments that must be paid in Newfoundland. Econometric evidence (Chapter 4) demonstrates that labour force participation rates, out-migration and in-migration all respond to local job creation. Hence one should expect Hibernia will increase the size of the Newfoundland labour force through a combination of greater in-migration, reduced out-migration, and increased labour force participation. The increase in the labour force participation rate alone can absorb virtually all the jobs created without makin more than an imperceptible dent in the measured unemployment rate. Depending upon wage and employment policy, the increase in the labour force induced by the development of Hibernia could exceed the number of jobs created both directly and indirectly, so that the unemployment rate could acutally rise.

Given the documented seasonal nature of construction employment in Newfoundland, and the nature of job sharing (as in spare-boarding on the railroad, or withdrawing from the labour force prior to the end of the working season in fish plants etc., (Chart 4-1) one cannot assume that the job sharing will not result in even larger qualifications for unemployment insurance than currently exists. In Newfoundland, special programs of very short term job-creation as an explicit means of creating eligibility for unemployment insurance are currently in place.

- Hence, it is not safe to assume that the development of Hibernia will reduce the measurable dependence of the province of Newfoundland upon transfers like Unemployment Insurance, the Gulf Subsidy, the loss on the railroad, or the need for federal funds to finance the maintenance of infrastructure such as the Trans Canada Highway.

- Given the negative present value currently implicit in Mobil's official development plans and the prospect for cost escalations in a project that "must" go ahead as matter of declared federal policy, it is not safe to assume that Hibernia will not become a net liability to Canadian taxpayers. Given the types of taxation concessions that may be granted to permit the companies to proceed in their implicitly constrained circumstances, it is not safe to assume that the economic burden of Hibernia will be borne evenly by all regions in Canada.

- It is not safe to assume that current real oil prices will hold. Prevailing expectations see reduced real international oil prices as likely, at least into the early 1990's, unless major supply disruptions occur. If prices are expected to begin to rise dramatically enough in the mid 1990's, the more recent EIS Update production profile could, conceivably, be more attractive than a profile that produced more of the reserves earlier. (The price rise would have to be dramatic enough to compensate for the longer period of interest charges before capital costs could be recovered.)

## Positive Things that Could be Done

**Neutral, economically resilient fiscal regimes could be considered.** To this end, the author rigorously analyses (in the next section of the paper) the risk-reducing features of two of the regimes discussed earlier (Copithorne, MacFadyen and Bell, 1985). But quite apart from the favourable effects that neutral, economically resilient fiscal regimes have on the mean and variance of the net present value of a project, the fact that such regimes are being considered might actually help the negotiations. When there is so much uncertainty on all sides, it might ease negotiations and reduce subsequent regret by the various participants if a deliberate attempt were made to share both upward and downward uncertainty in a fairly neutral way. If the companies, and the provincial and federal governments all agreed *a priori* on what their respective percentage shares of unforseen economic fluctuations were to be, there might be less incentive to withhold information or to try by extraordinary means to capture the benefits of Hibernia in ways that can conceivably cost the nation billions of dollars in dissipated economic rents, unnecessary subsidies and even a potential bailout.

**Information could be made public.** Many Canadians have a vested interest in megaprojects like Hibernia because the economic incidence of these projects often falls on people who have no obvious connection with Newfoundland. If companies, the federal government and all provincial governments (including Alberta, Nova Scotia and Quebec in the current case) have access to relevant information, negotiators may be encouraged evolve more economically neutral policies that have smaller social costs than would be the case if certain parties had priviledged access to information while others did not.

**Personnel policy could be tailored to increase probable success** of the project. If access to recruitment were nation wide with preference granted to persons living in Newfoundland at the time the Atlantic Accord was signed, there would be no need for a speculative migration back to Newfoundland in search of jobs related to Hibernia. If labour engaged on Hibernia projects were given some prior or contemporary claim on the economic rents of Hibernia, it might be possible to keep labour costs more readily under control (hourly earnings in manufacturing in Newfoundland exceed the national average) during difficult economic times, while granting workers *ex post* wage bonuses, if the economic rents materialized.

## Social Risk Analysis:

## Levelized Cost and Net Present Value as Random Variables

The Economic Council of Canada argues that energy policy should be conceived, not as a *program* with fiscal regimes established according to a particular scenario, but as a *strategy* to cope with all possible outcomes.[3] This requires that the mind set for energy policy negotiations be changed. Instead of having their analysts concentrate solely on alternative cash flow simulations of representative energy projects, or of particular energy projects like Hibernia, the negotiators should ask their analysts to study probability distributions of all possible outcomes of crucial variables. This different approach is illustrated below.

To illustrate this "strategy" approach, we need some simple statistics which can capture both the full range of unpredictable costs and revenues of the oil industry. Levelized social cost and the world oil price per cubic meter are two useful concepts to summarize this randomness. We can use them to study the effects of fiscal regimes on both the mean and variance of private net present value per cubic meter of oil. From empirical and theoretical studies of decision making (e.g. Grayson 1960, and earlier) we know that oil industry investors are influenced not only by the expected payoff, or mean net present value per cubic meter, but also by risk, of which the variance of net present value per meter is one useful measure.[4]

"Levelized social cost" or "real supply price" is that real price $P_o$ per cubic meter, which, if received for all units of output $q_t$ from a project over its lifetime, would enable the investor to completely recover his costs $C_t$ including interest at the rate 100r% specified in the formula

$$P_o = \frac{\Sigma C_t/(1+r)^t}{\Sigma qt/(1+r)^t}$$

Social cost refers only to the real costs of labour and capital needed to find and operate the project. It excludes all government taxes and transfers.

Since Hibernia is the first offshore oil project in Canada Lands, it should be negotiated in the context of setting a good precedent. There are probably hundreds of oil and gas pools in Canada Lands, each with its own peculiar levelized social cost of discovery, development and production. This cost depends upon a host of geological, geographical, engineering and economic factors. From the universe of oil and gas pools in existence, it is possible to conjecture about some sort of cumulative probability function showing the number of pools of oil whose levelized cost is less than $C per barrel, or the total volume of oil producible from pools whose levelized costs are less than $C per barrel (Figure 8-2). As drilling and production data are generated from a sedimentary basin over a period of years, the parameters of these probability functions become more and more evident.

FIGURE 8-2

LEVELIZED COST AS A RANDOM VARIABLE

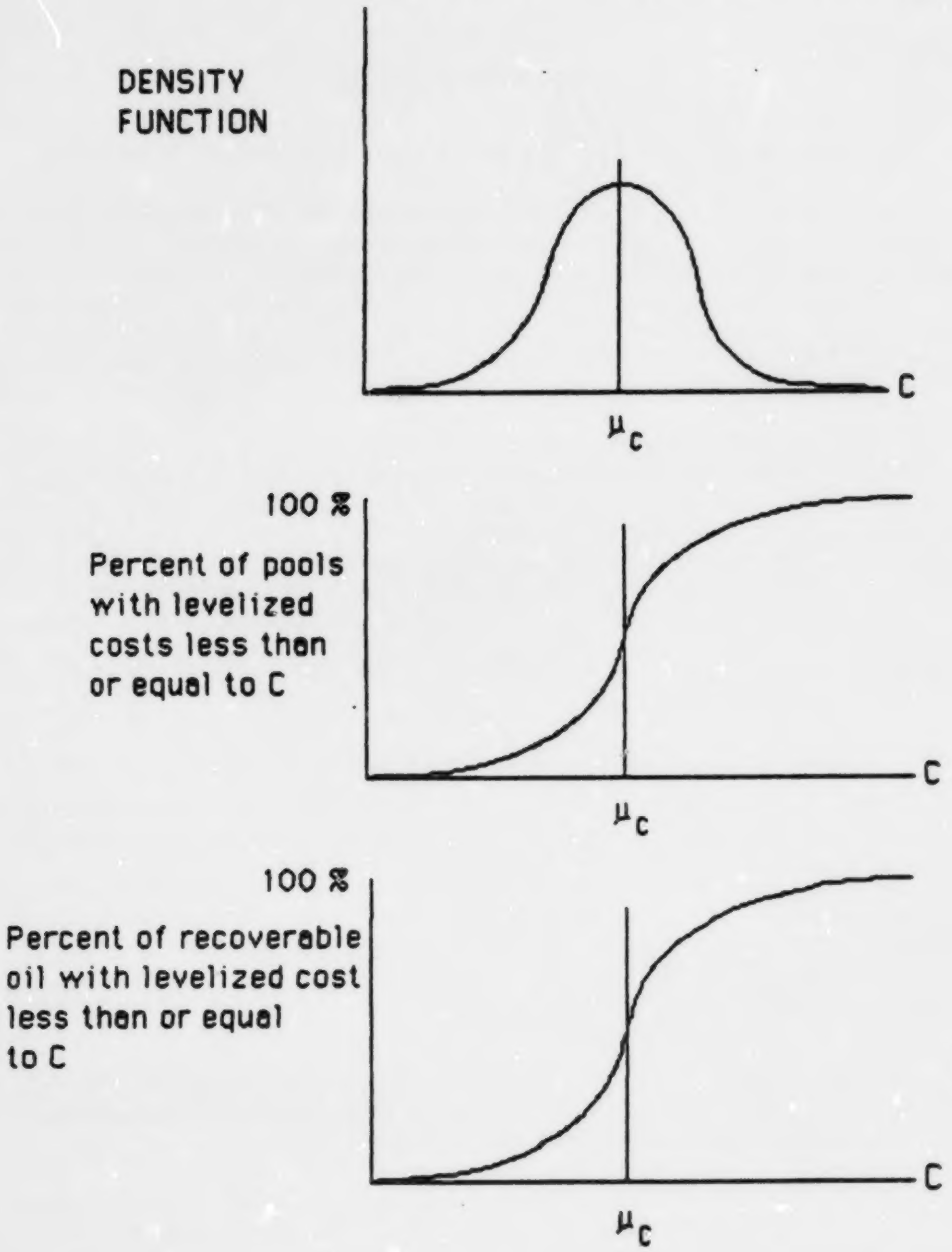
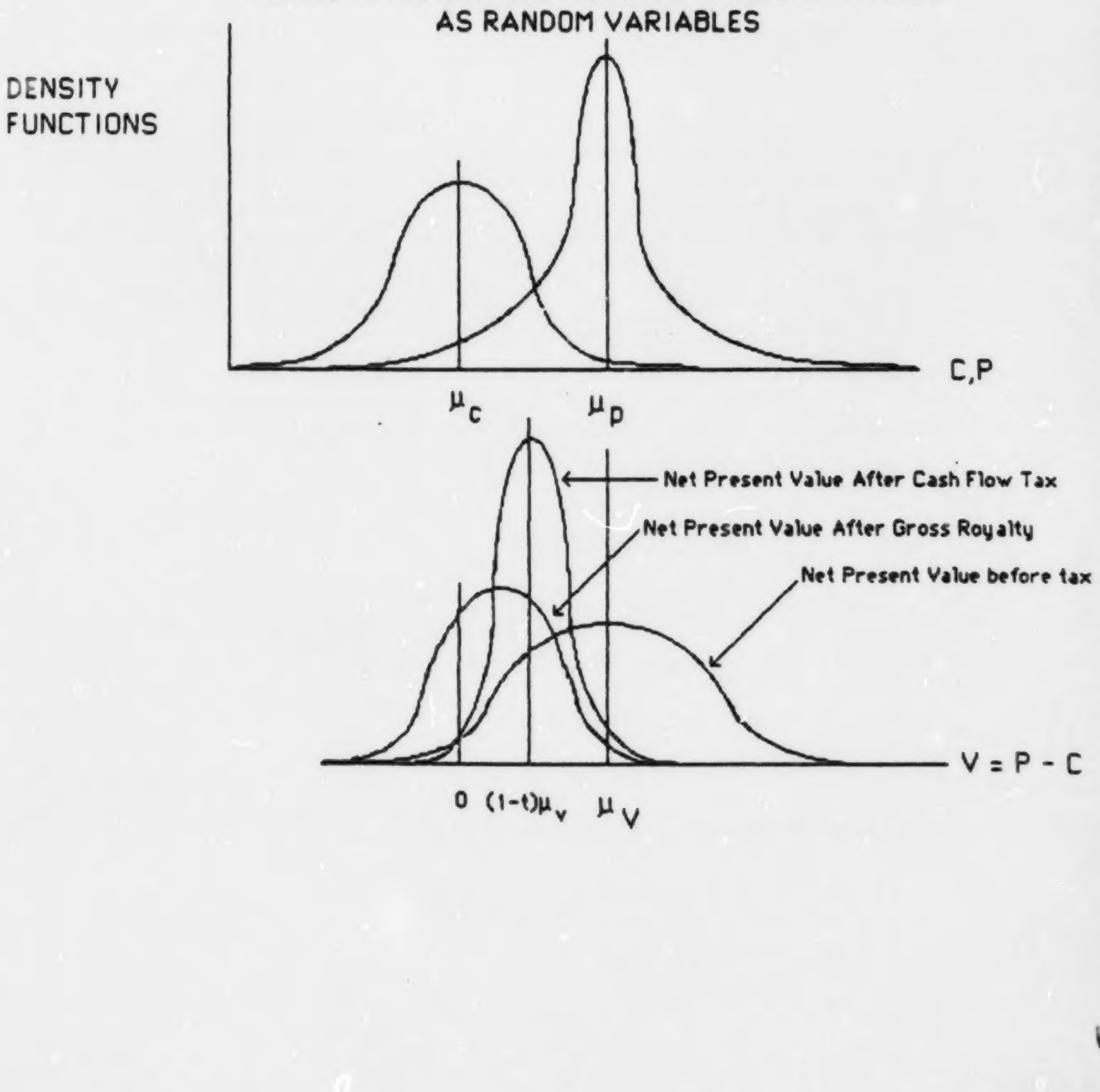

DENSITY FUNCTION
C
$\mu_c$
100 %
Percent of pools with levelized costs less than or equal to C
C
$\mu_c$
100 %
Percent of recoverable oil with levelized cost less than or equal to C
C
$\mu_c$

FIGURE 8-3

PRICE, LEVELIZED COST AND NET PRESENT VALUES AS RANDOM VARIABLES



The concept of per unit social net present value (per cubic meter of recoverable oil) is a normalized concept (Figure 8-3) that can be obtained from the difference between the world price of oil (adjusted for transportation costs and quality differentials) and the per unit levelized cost concept. Per unit social net present value is a measure of the amount of economic rent per cubic meter to be drawn from each particular pool. The fact that per unit social net present value is the difference between two random variables means that it is a random variable itself whose variance is the sum of the variances of levelized cost and of the world oil price.

In Figure 8-3 we conceive of a company drawing an oil pool at random, and drawing oil prices at random as well. Social net present value, V, can be portrayed as the difference between the world oil price, P, and the levelized cost, C:

(1) $V = P - C.$

The world oil price can be expected to fluctuate a great deal during the 10 to 30 year life of an oil pool, so the net present value realized per cubic meter will fluctuate a great deal as well. Real costs of production are dependent on the luck of the draw at the beginning of a project (dependent on the many geophysical characteristics of an oil pool which determine its cost of discovery, development and production) but thereafter, the real levelized social cost will be fairly constant. In the presence of uncertainty, oil companies and governments have to make their decisions largely on what they think will be the expected net present value, E(V), which is, by definition, the average or mean net present value $\mu_v$. The expected social net present value of a cubic meter of oil is merely the difference between the expected price of oil, $E(P) = \mu_p$ and the expected levelized cost, $E(C) = \mu_c$. From the definition $V = P - C$ where P and C are random variables with particular means $\mu_p$ and $\mu_c$, and variances $\sigma_p{}^2$ and $\sigma_c{}^2$, we obtain

(2) $E(V) = E(P) - E(C)$ or $\mu_v = \mu_p - \mu_c$

and $\mathrm{Var}(V) = E(V - \mu_v)^2 = E[P - C - (\mu_p - \mu_c)]^2 = E[(P - \mu_p) - (C - \mu_c)]^2$

whence $\mathrm{Var}(V) = E(P-\mu_p)^2 - 2E(P - \mu_p)(C - \mu_c) + E(C - \mu_c)^2$

or $\mathrm{Var}(V) = \mathrm{Var}(P) - 2\mathrm{Cov}(P,C) + \mathrm{Var}(C).$

Since the world oil price and the levelized costs of producing oil in Canada Lands are statistically independent, they have zero covariance, i.e. $\mathrm{Cov}(P,C) = 0$. Hence the variance of net present value per cubic meter of oil is

(3) $\mathrm{Var}(V) = \mathrm{Var}(P) + \mathrm{Var}(C)$ or $\sigma_v{}^2 = \sigma_p{}^2 + \sigma_c{}^2$

## The Impact of Government Policy on Means and Variances of Net Present Value per Cubic Meter

Although government policy may have relatively little influence on levelized social cost, per unit social net present value or the internal social rate of return, it can have a profound effect on per unit levelized *private* cost, *private* net present value and *private* internal rate of return. The effect of government policy on economic incentives can be portrayed as the extent to which it distorts the shape of private probability distributions away from social probability distributions (Figure 8-3).

### The Flat Rate Gross Royalty

Assuming the government allows the company to receive the world price for oil, a flat rate gross royalty of 100 $\delta$ percent on the gross value of oil has the effect of reducing both the mean and variance of net present value, but high royalty rates can cause a negative expected value. The definition of private net present value $V^*$ per cubic meter is the social present value V minus the royalty of $\delta P$ per cubic meter, i.e.

$$(4) \quad V^* = V - \delta P = P - C - \delta P = (1-\delta)P - C$$

The mean or expected private net present value, $\mu_{V^*}$ is

$$(5) \quad E(V^*) = E\,(1-\delta)P - E(C) = (1-\delta)\mu_p - \mu_c.$$

The variance, $\sigma_{V^*}{}^2$ (a measure of risk) associated with private net present value is

$$(6) \quad \mathrm{Var}\,(V^*) = E(V^* - \mu_{V^*})^2 = E\{[(1-\delta)P - C] - [(1-\delta)\mu_p - \mu_c]\}^2$$

$$= E[\,(1-\delta)(P - \mu_p) - (C-\mu_c)]^2$$

$$= (1-\delta)^2E(P - \mu_p)^2 - 2(1-\delta)E(P - \mu_p)(C - \mu_c) + E(C - \mu_c)^2$$

$$= (1-\delta)^2\sigma_p{}^2 - 2(1-\delta)\sigma_{pc} + \sigma_c{}^2$$

$$= (1-\delta)^2\mathrm{Var}(P) + \mathrm{Var}(C), \text{ since } \mathrm{Cov}(P,C) = 0.$$

If one raises the gross royalty rate, $\delta$, too far, we see from equation (5) that the expected private net present value per cubic meter can go negative (if $\delta > 1-\mu_c/\mu_p$). At such royalty rates, it is not just a few marginal oil pools that would be rendered uneconomic; rather, the average oil pool would be uneconomic. Under those circumstances, the average oil explorationist would go broke, and only risk lovers would be willing to explore.

The fact that gross royalties have to be modified to fit the productivity of individual wells and to adapt to unexpected price changes is not new, of course. The history of the evolution of the Alberta Oil Royalty is testimony to that (Sommerville 1977, and Webster1983). This history demonstrates a gradual evolution from a net profit royalty (which was probably never used) through flat rate royalties, to a productivity- related royalty on natural gas liquids in the late 1930's, to a general sliding scale oil royalty related to the productivity of individual wells in 1941. Oil prices were directly incorporated into the royalty formula in 1974 by means of politically adjustable parameters.

It seems that economic reality has forced negotiators to unknowingly grope towards the economist's concept of marginal value product whereby a resource would be priced at its marginal physical productivity multiplied by the price of oil. But the formula has not yet reached the ultimate goal of its evolution, because the formula does not yet truly measure marginal physical product, and the 'par price' and 'select price' in the formula are politically determined benchmarks, not the true price of oil. The fact that price is incorporated by means of politically adjustable parameters serves to increase risk, because political responses are themselves random variables which have unknown variances.

## The Simple Cash Flow Tax

If the government imposes a cash flow tax of 100 t per cent, the mean of private net present value per barrel is again reduced, but it can never be driven negative. It will never drive a profitable industry out of existence, even if the tax rate rises to 100 per cent. Furthermore, the variance of private net present value is reduced to a much greater extent than is true for a gross royalty. The reduction in variance is indeed compensation for the reduction in mean net present value. Many risk averse private investors would actually find investments more desirable in the presence of a cash flow tax; although the tax reduces the present value of their investments, it also reduces their riskiness; under a simple cash flow tax government shares in negative cash flows as well as in positive ones.

Define the per unit tax on cash flow as $T = t(P-C)$. Then the definition of private net cash flow per cubic meter is

$$V^* = P - C - t(P-C) = (1-t)(P-C) \tag{7}$$

The expected private net present value per cubic meter is

$$E(V^*) = (1-t)[E(P)-E(C)] = (1-t)(\mu_p - \mu_c) = (1-t)V \tag{8}$$

The variance of private net present value per cubic meter is

$$\begin{aligned} \text{(9)}\quad \mathrm{Var}(V^*) &= E(V^* - \mu_{V^*})^2 \\ &= E[(1-t)(P-C) - (1-t)(\mu_p - \mu_c)]^2 \\ &= (1-t)^2 E[(P - \mu_p) - (C - \mu_c)]^2 \\ &= (1-t)^2[\mathrm{Var}(P) + \mathrm{Var}(C)], \text{ assuming } \mathrm{Cov}(P,C) = 0. \end{aligned}$$

Hence, $\mathrm{Var}(V^*) = (1-t)^2\mathrm{Var}(V)$

As the tax rate is increased from zero, it reduces the expected value of private net present value per cubic meter proportionately (8), but it reduces variance exponentially (9). The cash flow tax reduces risk much faster than it reduces expected return (Table 8-3). A 10 per cent cash flow tax absorbs 19% of the variance; a 30% cash flow tax absorbs 51% of the variance; a 50% cash flow tax absorbs 75% of the variance. It is highly likely that moderate rates of cash flow tax would actually attract more risk capital to the oil industry because the government would, in effect, be assuming a large part of the risk in its role as an implicit co-venturer.

But there is not a great deal of risk in this system for the nation as a whole; the nation actually becomes a type of self-contained insurance company which accepts private risk in return for insurance premiums paid in the form of positive net cash flows from successful oil and gas projects. Since private corporations are profit maximizers, and probably risk averse on average, they will--as a group--only undertake projects which have a positive net cash flow on average.

In principle, the cash flow tax can reduce the variance of private net cash flow arbitrarily close to zero by raising the tax rate arbitrarily close to unity. (In reality, tax rates cannot be raised very close to unity without destroying the private company's incentive to control costs.) As long as the expected world oil price exceeds the expected levelized costs of finding, developing and producing oil, the cash flow tax guarantees that the expected net present value of searching for oil will always be positive. Oil companies will always have a better than even chance of making more money in oil than in alternative investments.

Table 8-3
Impact of the Cash Flow Tax on Private Investment Incentives

| Tax Rate | Expected Social Net Present Value | Expected Private Net Present Value $(1-t)\mu_v$ | Variance In Social Net Present Value | Variance In Private Net Present Value $(1-t)^2\sigma_v{}^2$ |
|---|---|---|---|---|
| 0.1 | 1 | 0.9 | 1 | 0.81 |
| 0.2 | 1 | 0.8 | 1 | 0.64 |
| 0.3 | 1 | 0.7 | 1 | 0.49 |
| 0.4 | 1 | 0.6 | 1 | 0.36 |
| 0.5 | 1 | 0.5 | 1 | 0.25 |
| 0.6 | 1 | 0.4 | 1 | 0.16 |
| 0.7 | 1 | 0.3 | 1 | 0.27 |
| 0.8 | 1 | 0.2 | 1 | 0.04 |
| 0.9 | 1 | 0.1 | 1 | 0.01 |
| 1.0 | 1 | 0.0 | 1 | 0.00 |

If governments tax energy projects heavily and keep changing the rules, they can reduce the mean and actually *increase* the variance--both factors being strong disincentives for risk-averse private investors. For example, Energy Mines and Resources Minister Marc Lalonde declared in the preface to the National Energy Program Update in May 1982 that:

> "The National Energy Program is not a single document, nor a static set of policies. The National Energy Program is a dynamic and comprehensive set of evolving responses to a changing world--whether through compromise with provinces, or through necessary mid-course corrections in specific initiatives or the fiscal burden. The National Energy Program has changed, and will continue to do so, as circumstances change and new opportunities emerge..."

This declaration that the fiscal regimes would continue to change unpredictably in political response to everything from "a changing world" to specific political initiatives or government fiscal needs could not help but raise great uncertainty in investors' minds. It raised the variance in private net present value per cubic meter of oil.

If politicians insist on continuous ad hoc intervention in fiscal regimes, they undermine economic incentives in an unnecessary way. As the Economic Council suggested (1985), it is far better to search for economically resilient fiscal regimes that can automatically absorb unexpected fluctuations in costs and revenues without political intervention.

Again, compare the performance of the flat rate royalty and the cash flow tax. Suppose the royalty and cash flow tax rates had been set in an earlier era when oil prices had been in the order of $\$200/m^3$, costs has been $\$100/m^3$, and that the electorate had decided to share the economic rents 50:50 between the companies who discovered and produced the oil pools and the government which owned them. The government could meet the demands of the electorate with a rather modest-sounding 25 per cent royalty rate or a rather more onerous-sounding 50 per cent cash flow tax, but both would collect $50 in economic rent on every unit of oil produced (Table 8-4).

The royalty would be powerless to respond to unexpected changes in costs, whereas the cash flow tax would automatically absorb 50 per cent of any unexpected decline in costs, and it would give automatic tax relief for 50 per cent of an unexpected increase in costs. The current Alberta royalty on conventional oil has physical productivity measures built into it, but there is no mention of any costs per se. The current Frontier gross royalty which escalates from 1 per cent in the first 18 months to 5 per cent after 6 years, has no capability of responding to changes in costs.

Now, starting from the base case (Table 8-4) suppose that price increased 50% to $\$300/m^3$. The flat rate royalty would capture only 25% of the price increase by comparison with 50% in the case of the cash flow tax. As a result, politicians might be called upon to make an ad hoc adjustment in the royalty rate because the amount of economic rent going to companies would have increased 250 per cent whereas the rents going to the government owners would only have increased only 50 per cent.

In the case where oil prices unexpectedly fell 50 per cent, the flat rate royalty would only decline by $50 per unit, thereby rendering the typical oil pool uneconomic. The cash flow tax, on the other hand would automatically give 100% tax relief in the event of the 50% price decline, leaving the typical oil pool economically viable.

The politicians would obviously have to intervene to prevent the companies from getting the lion's share of the economic rents in the case of an unexpected price increase, and to prevent the companies from going bankrupt in the case of the price decline. But they would not need to make any changes in the case of the cash flow tax; society would continue to share the economic rents with the companies in exactly the same proportion as was intended at the time the original legislation was passed, no matter whether prices increased or declined. The cash flow tax is economically resilient; the gross royalty is not.

Table 8-4
Illustrating the Economic Resilience of the Royalty and Cash Flow Tax

| | | | Effect of 25 % Royalty | | Effect of 50% Cash Flow Tax | |
|---|---|---|---|---|---|---|
| Price | Levelized Cost | Net Present Value (Economic Rent) | Rent to Company | Rent to Government | Rent to Company | Rent to Government |
| | | | $ / m$^3$ | | | |
| Base Case Initially Expected | | | | | | |
| 200 | 100 | 100 | 50 | 50 | 50 | 50 |
| Unexpected Cost Changes | | | | | | |
| 200 | 50 | 150 | 100 | 50 | 75 | 75 |
| 200 | 150 | 50 | 0 | 50 | 25 | 25 |
| Unexpected Price Changes | | | | | | |
| 300 | 100 | 200 | 125 | 75 | 100 | 100 |
| 100 | 100 | 0 | -25 | 25 | 0 | 0 |

**Current fiscal regimes are not as economically resilient as they could be.** We do not yet know what the fiscal regime will be for Hibernia. However, there is a high probability that it will contain elements that are not dissimilar to the traditional rent collectors and subsidies already in existence. The very small flat rate royalties currently in place for the first six years of Frontier projects are intended to be just that--small. As flat rate royalties, they are not very economically resilient. The 30 per cent cash flow tax after the company has received payout with interest is clearly a good method of collecting a moderate fraction of economic rents from ring-fenced projects, but it could be better. The current 30 per cent rent collection on Canada Lands takes 30 per cent of the present value of the project but leaves 100 per cent of the risk on the shoulders of the companies. It does not become applicable until discounted payout has occurred and all the serious risk has been overcome. By using only the 'tail end' of the cash flow tax, the current Frontier regime has totally overlooked the risk-reducing characteristic the cash flow tax could have.

It is a pity that the federal budget of May 1985 did not contain any new 'profit-oriented' tax as the Western Accord hinted it would. Had a true cash flow tax been introduced at that time, the federal government would have had a legitimate tool by which to inject money into the Hibernia project with a good expectation of getting its money back, since the above analysis--correcting for the apparent biases of vested interests in reporting data--suggests that there may yet be significant economic rents in Hibernia. If such a cash flow tax had been introduced as general tax on all pure profits without regard to industry (as Boadway, Bruce and Mintz advocate1984) then the federal tool would already be in place and it would not violate provincial or industrial sensitivies. As it is, the provincial government's financial situation is too weak to permit it to inject funds into Hibernia; the federal government will have to. Without a cash flow tax, or similar economic tool, the federal government will have to make concessions with the only tool left in its control--the corporation income tax and the battery of subsidies traditionally tied to it.

The federal government will not get away without any fiscal concessions for Hibernia because it has already commited itself publicly to making the project run. Refusing to offer any concessions in the face of publicly released "evidence" that the project cannot proceed without financial assistance will put the government in an untenable position. Both federal and provincial public servants are clearly geared up to negotiation some form of "relief" for the project. The only questions are which tools, and how much.

The question then boils down to analysing the effects that faster tax writeoffs, tax credits, depletion allowances and super depletion allowances have on the mean and variance of the net present value per cubic meter of oil in Hibernia. The onus should be on both the company and government negotiators to demonstrate that whatever fiscal regime they devise can outperform the cash flow tax by both criteria, and under all possible outcomes.

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## Notes

* The author sincerely thanks senior officers of the Federal Economic Development Coordinator in Newfoundland, the Newfoundland Petroleum Directorate, the Canadian Oil and Gas Lands Administration, the Newfoundland Departments of Finance, Fisheries, the Executive Council, and Intergovernmental Affairs Secretariat, Newfoundland and Labrador Hydro, the Newfoundland Institute of Fisheries and Marine Technology, the Canadian Departments of Finance, Energy Mines and Resources, Fisheries and Oceans, and certain members of the Economic Council of Canada for constructive criticism of earlier drafts of this work. To avoid implicating these people in the text that follows, the author does not name them, and he alone accepts responsibility for the opinions and interpretations contained in this paper.

The author's own cash flow analyses in Chart 8-1 and Appendix G emanante from earlier scenarios he developed in cooperation with University of Calgary students Janusz Bielecki and Brian Schellenberg whose summer work in 1985 was funded by a Research Agreement for universities funded by Energy, Mines and Resources Canada. The author wishes to thank both Mssrs. Bielecki and Schellenberg, and EMR.

The author also acknowledges extremely important assistance from Dr. Alan MacFadyen. It was Dr. MacFadyen's lectures in petroleum economics and access to his personal library that gave rise to many of the insights developed in this paper.

1. The data presented in Chart 8-1, Table 8-1 and Appendix Table G-2 are only rough ball park figures assembled from somewhat fragmentary information available in the published work by Wilby, Eglington and Ufflemann, and the Environmental Impact Statement. The author did not have access to the consultants' 1980 report to the Newfoundland and Labrador Petroleum Directorate. The papers by Wilby, Eglington and Ufflemann do not contain enough data to permit precise recreation of their original data, although the current scenario's recreate their results fairly closely.

Nor did the author have accurate data on exploration expenditures expended by the Hibernia consortium up to 1985. It was assumed that these exploration expenditures carried forward to 1985 were roughly equivalent to a lump sum value of $328 million expended in that year. This assumption probably understates the true impact of exploration expenditures on the full cycle costs of the project.

2. By comparison with the original EIS statement, total oil recovery in the August EIS Update is estimated to be 15% lower; we estimate a 7.2% saving in total development costs and a 14.6 % saving in annual operating costs. The levelized cost of producing the oil rises by 19.7%. The peak output rate falls by 38.3%. Mobil has also delayed drilling some of its subsea satellite wells until later in the program for which we did not make allowance.

3. Economic Council of Canada (1985) *Connections: An Energy Strategy for the Future*, Supply and Services Canada (Ottawa).

4. One could also use the internal rate of return on energy projects as a target statistic. We prefer to use net present value per cubic meter. Net present value reflects the opportunity costs of funds to the firm and is uniquely defined for any given project. Sometimes a given investment project may have more than one internal rate of return.

# APPENDIX A

# LIST OF THE ECONOMIC COUNCIL'S RECOMMENDATIONS

Because Newfoundland's economic problems cut across many policy areas and even involve the Terms of Union, we believe that the Government of Newfoundland and Labrador needs to enter into broad negotiations with the Government of Canada to change a wide range of government policies, in order to overcome entrenched economic problems in the Newfoundland economy – in effect, to give Newfoundland a new deal. The objective should not be to cut off the transfers to Newfoundland but to reorganize them in a way that will compensate persons affected by the policy changes and reduce or eliminate the detrimental side effects that the current system of transfers has on economic efficiency, incentives, and equity. As long as per capita income in Newfoundland is below that in Canada, net transfers will remain, but they will diminish as Newfoundland's economy improves relative to the national average. The solution to Newfoundland's economic problems does not lie in increasing global transfers to that province, but in raising the efficiency and self-reliance of its economy. Therefore,

1 **We recommend that the Newfoundland government adopt a strategy for the island of Newfoundland that aims to provide services and employment opportunities within commuting distance of most outports on major peninsulas, so that rural people can participate in the market economy without giving up their homes and moving their families. Within each major peninsula, the services, infrastructure, and related employment opportunities should generally be located in one or two urban centres on, or very accessible to, the Trans-Canada Highway. The highway should be upgraded to link these urban centres with two major entrance points.**

2 **We recommend that the federal government expand and upgrade the harbour facilities in the St. John's area in the east and at a single point in the west, to facilitate handling of containerized and roll-on/roll-off cargoes. It is important that the western port selected be a large urban centre, chosen to minimize the length of highway needed to connect it to major peninsular centres and St. John's.**

3 **We recommend that the federal and provincial governments immediately enter into negotiations to establish a federal financial obligation to the Newfoundland government in place of the existing Gulf subsidy. They should also arrange to finance the adjustment of any workers directly affected by this action.**

4 **We recommend that, to combat seasonality in employment, the local, provincial, and federal governments improve the timing of their budget decisions and the planning of their construction projects, that they experiment with a shared-cost winter works program, and that they plan their hiring so as to avoid seasonal peaks and troughs in their own employment rolls.**

5 **We recommend that migration be neither encouraged nor discouraged. Specifically, policies such as those pertaining to regionally extended benefits and differential eligibility requirements for unemployment insurance should be reconsidered with a view to removing incentives or disincentives to migration, either within provinces or between provinces.**

6 **We recommend that governments not force the creation of jobs in outports or smaller urban centres if such jobs would be more likely to remain economically viable in larger urban centres within commuting distance of outport people.**

7 **We recommend that the Newfoundland Minister of Labour, with the backing of the federal Minister of Employment and Immigration, enter into negotiations with local labour union representatives, trade schools, and businesses, to establish, by the end of 1981, a system of on-the-job training, apprenticeship, and certification that will ensure that Newfoundland tradesmen are trained**

**to the highest national standards and given access to jobs all across the nation, which would enable them to obtain more continuous employment and thereby gain more experience and proficiency.**

**8 We recommend that the Government of Newfoundland and Labrador, with the assistance of the federal government, the labour unions, and the private oil companies, establish in the St. John's urban region, by 1981, a centre for the training and certifying of workers for the offshore petroleum industry.**

**9 We recommend that the province adopt the objective of reducing the existing productivity disparity between Newfoundland and the rest of Canada by at least one-third by 1990. To this end, the Newfoundland government should establish an advisory council on industry performance that would report publicly each year to the Premier and that would have a broad mandate to monitor, study, report, and advise on any aspect relating to productivity and efficiency in the provincial economy.**

**10 We recommend that the federal and provincial governments step up their bioeconomic research into the fishery – especially to provide more information about inshore/offshore trade-offs and fish processing – and publish their findings so as to facilitate more economic management of the fish stocks and related industries.**

**11 We recommend, as a matter of urgency, that the Department of Fisheries and Oceans license the entire Atlantic fishery, by appropriate management categories; that it strictly control the number of commercial fishing licences in each category; and that it charge a suitable fee for each licence, which should be for a specific number of years and transferable.**

**12 We recommend that the Department of Fisheries and Oceans introduce, as soon as possible, a system of medium-term transferable landing rights for Canadian fishermen and fishing enterprises in the *offshore* Atlantic groundfishery.**

**13 We recommend that within two years of limiting the landing rights in the offshore groundfishery the Department of Fisheries and Oceans extend the system of medium-term transferable landing rights to the *inshore herring fishery.***

**14 We recommend that within three years of stinting landing rights in the offshore groundfishery the Department of Fisheries and Oceans create a set of medium-term transferable landing rights to be reserved for inshore vessels of the *longliner* class, harvesting groundfish.**

**15 We recommend that gear, boat, and other subsidies to the fishery be discontinued.**

**16 We recommend that the federal government institute a system of self-financing, compulsory income insurance for self-employed fishermen or require that fishermen take out similar income insurance with private companies. In either case the government should make some contribution in the early years to the cost of setting up this insurance program.**

**17 We recommend that the federal and provincial governments explore the sharing arrangements for harvesting fish within the 200-mile limit, not only among themselves but between them and the foreign fleets. In relation to foreign participation, particular attention should be given to the capture of appropriate rents from foreign fleets and the employment of Canadian fish processing facilities. These sharing arrangements can be applied to all types of fish.**

**18 We recommend that, in view of the failure of international authorities to police effectively the Nose and Tail of the Grand Banks of Newfoundland and in view of the need for effective control in these areas in order to enable competent management of fish stocks in the Canadian portion of the Grand Banks, the Government of Canada – with due regard to timing and international political consequences – explore the possibility of stepping up surveillance in the Nose and Tail of the Grand Banks and ultimately assuming complete policing duties in these areas to ensure that the international regulations are being enforced.**

**19 We recommend that an independent board be created to establish quality standards and to develop, institute, and enforce a system of quality grading and quality control in the North Atlantic fishery.**

**20 We recommend that the Newfoundland government develop a strategy, in consultation with the large forestry companies and small sawmills, to establish a more integrated forest industry to enhance utilization of the existing natural resource.**

**21 We recommend that the federal government cooperate with the Newfoundland government in the development of a comprehensive strategy to combat property speculation and bottlenecks in the areas to be affected by the oil industry. The strategy should include the gradual phased development of new oil fields; public announcement of the desired locations for industry development; provision of serviced residential and commercial land in these areas; increased capacity in the existing infrastructure to avoid potential bottlenecks; modernization of building codes; approval for mobile and prefabricated homes; and a mechanism to capture, for the public, any short-term**

unearned increments in property values and to provide incentive for early development. The strategy should exclude rent controls or land price controls.

22 We recommend that the Government of Newfoundland and Labrador establish a provincial Crown corporation to receive a substantial specified share of the province's future oil and gas revenues. It should be charged with the responsibility of investing those revenues, on behalf of the public, in both short- and long-run securities and in specific projects in accordance with an explicit long-run economic development strategy that would be made public each year. The strategy should include plans not only to create employment in the medium term, but also to ensure a flow of revenue to Newfoundland after the oil runs out.

23 We recommend that offshore oil in the Newfoundland area be valued, within the confines of Canadian energy policy, as closely as possible to the long-run cost of acquiring additional oil for Canadians.

24 We recommend that the provincial Minister of Finance and appropriate colleagues initiate negotiations with their federal counterparts to explore changes in the fishermen's and the regionally extended benefits provisions of the Unemployment Insurance Act as they apply to Newfoundland by replacing them with flat-rate benefits or an alternative income maintenance system financed by a federal/provincial funding mechanism that would make it possible to extend a similar offer to other provinces and to reduce total federal transfers to Newfoundland as per capita incomes and provincial government revenues rise towards the national average.

25 We recommend that the provincial Minister of Labour and the federal Minister of Employment and Immigration jointly negotiate a wage subsidy program and an early retirement scheme for the working-age people born before 1925 who have been long-term residents of Newfoundland and who have limited education.

# APPENDIX B

# NEWFOUNDLAND REFERENCE BACKGROUND STUDIES

## Economic Council Staff Studies*

Harry H. Postner (1980) *A New Approach to Frictional Unemployment: An Application to Newfoundland and Canada.*

Gordon R. Munro (1980) *A Promise of Abundance: Extended Fisheries Jurisdiction and the Newfoundland Economy.*

John A. Gray (1981) *The Trees Behind the Shore: The Forests and Forest Industries in Newfoundland and Labrador.*

Neil M. Swan and Paul J. E. Kovacs (1981) *Empirical Testing on Newfoundland Data of a Theory of Regional Disparities.*

## Economic Council Discussion Papers**

No. 173 Stephen Ferris and Charles Plourde (1980) "Fisheries Management and Employment in the Newfoundland Economy".

No. 178 Denis Gauthier (1980) "Some Economic Aspects of Internal Migration: Newfoundland's Case".

No. 179 Nancy D. Oleweiler and Charles H. Pye (1980) "Job Creation Prospects in the Newfoundland Mining Industry".

No. 180 William E. Schrank, Noel Roy and Eugene Tsoa (1980) "The Relative Productivity and Cost-Effectiveness of Various Fishing Techniques in the Newfoundland Groundfishery".

No. 182 W. Craig Riddell (1980) "Unanticipated Inflation and Unemployment in Canada, Ontario and Newfoundland".

No. 183 Walter S. Good (1980) "Productivity in the Retail Grocery Trade: A Newfoundland-Ontario Comparison", with Econometric Analysis by J. Wilby.

No. 186 J. F. Wilson (1981) "Seasonal Unemployment in Newfoundland: Trends and Determinants".

No. 187 Eugene Tsoa, Noel Roy and William E. Schrank (1981) "U.S. Demand for Selected Groundfish Products".

No. 189 R. W. Boadway and A.G. Green (1981) "The Economics of Migration: The Case of Newfoundland".

No. 190 Noel Roy, William. E. Schrank and Eugene Tsoa (1981) "Cost and Production in the Newfoundland Fish Products Industry".

No. 191 Frank R. Flatters (1981) "Productivity, Transfers and Employment: Government Policies and the Newfoundland Economy".

No. 195 Richard C. Zuker (1981) "Simulating Some Income Supplementation Programs for Newfoundland".

No. 196 Lawrence W. Copithorne (1981) "Economic Theories for Small Marine Economies: An Interpretation for Newfoundland" (A Reader's Guide to the Research Program of the Newfoundland Reference).

No. 197 Johnathan Wilby (1981) "Revenue Implications of Offshore Oil Under Different Taxation and Profit-Sharing Regimes".

* The main Economic Council report, *Newfoundland: From Dependency to Self-Reliance*, and the Economic Council staff studies can be obtained from university bookstores, or the Canadian Government Publishing Centre, Hull, Québec, K1A 0S9 (Telephone (613)-993-3475).

** Economic Council of Canada Discussion papers are available free of charge in limited quantities from the Communications Division, Economic Council of Canada, P.O. Box 527, Ottawa, Ontario, K1P 5V6 (Telephone (613)-993-1253).

## Journal Articles, Conference and Library Papers Emanating From Research Done on the Newfoundland Reference

Robin Boadway and Frank Flatters, "The Efficiency Basis for Regional Employment Policy", *Canadian Journal of Economics,* Vol. XIV, No. 1, February 1981.

J. S. Ferris and C.G. Plourde, "Labour Mobility, Seasonal Unemployment, and the Newfoundland Inshore Fishery", *Canadian Journal of Economics*, Vol. XV, No. 3, August 1982

Gordon R. Munro, "Fisheries, Extended Jurisdiction and the Economics of Common Property Resources", *Canadian Journal of Economics*, Vol. XV, No. 3, August 1982.

Noel Roy, William E. Schrank, and Eugene Tsoa, "The Newfoundland Groundfishery: Some Options for Renewal", *Canadian Public Policy*, Vol. VIII, No. 2, Spring 1982.

Eugene Tsoa, William E. Schrank and Noel Roy, "U.S. Demand for Selected Groundfish Products, 1976-80", *American Journal of Agricultural Economics*, Vol. 64, No. 3, August 1982.

E. Tsoa, W.E. Schrank and N. Roy, "Generalizing Fisheries Models: An Extension of the Schaefer Analysis", *Canadian Journal of Fisheries and Aquatic Sciences*, Vol. 42. No 1., 1985.

P. J. E. Kovacs and L. W. Copithorne, "Aspects of the Newfoundland Labour Market", *Proceedings*, Atlantic Canada Economic Association, October 1979.

Brian C. Bursey (1981) "A Half Century of Progress? A History of Economic Growth and Development in Newfoundland During the Modern Period 1930-1980". (On deposit at several university libraries in Canada, and the National Library, Ottawa.)

# APPENDIX C

## NEWFOUNDLAND'S RESPONSE TO THE ECONOMIC COUNCIL STUDY

In October 1980 the Government of Newfoundland and Labrador published a comprehensive document *Managing All Our Resources: A Development Plan for Newfoundland and Labrador, 1980-85*. Although it published this report a month ahead of the Economic Council's *Newfoundland: From Dependency to Self Reliance*, this Newfoundland document really constitutes the government's first response to the Economic Council's work because it was developed during 1978-1980 when many of its authors and advisers were in close contact with the Economic Council's research team. If one compares *Managing All Our Resources* with the Government's previous 1979 Budget Document written under the new Premier, (The Hon. A. Brian Peckford) and the 1978 *Blueprint For Development*, (written under the previous premier, the Hon. Frank Moores prior to the initiation of the Council study), one can see important changes wrought by the joint learning experience.

If one compares the Economic Council document to the 1978 *Blueprint*, one notices that natural resource export-base theory was prominent in both documents, but the Council considered other sources of economic growth as well. Labour supply issues received scant attention in the *Blueprint*. The Council, on the other hand identified the significance of large back-migration, cyclically influenced in-, out- and net-migration, and the strong response of the labour force participation rate to job creation. Whereas the *Blueprint* saw productivity increase as a means of destroying employment, The Council believed the opposite, on balance. The *Blueprint* paid little or no attention to the economic effects of unemployment insurance, the transportation system, seasonality or settlement patterns.

The 1979 Budget Document emphasized a new government, "a new era...a fresh energetic Administration". It implicitly adopted the same natural resource-based economic philosophy to "ensure the future prosperity ...through the maximization of our natural wealth". It recognized that the province was not collecting "fair economic rent" from resources alienated in past history. It recognized "a sizeable local market" as an asset. It heralded the advent of a new policy to fight for employment opportunities by tying local employment and local procurement restrictions to local natural resource development, especially in offshore oil and gas. (Hence the natural resource-based philosophy took on a new rationale--tying footloose jobs to the captive natural resource.) It called for the transfer of fisheries management from the federal to the provincial government.

Some parts of *Managing All Our Resources* are similar to the Council's document, notably in discussions of history, productivity, labour market ideas (participation rates, seasonality, demographic projections, migration), some data on social and economic disparities, and a tiny bit on settlement. The Newfoundland government took a decidedly nationalistic stance on the fishery and transportation policy that bore no apparent influence from the Council's work. The Newfoundland government avoided mention of Unemployment Insurance or improving urban structure. (Any suggestion of tampering with Unemployment Insurance would automatically threaten a large portion of the family incomes of a very large proportion of voters; any talk of "settlement patterns" would--and did--conjure up voters' long and bitter memories of the "Resettlement Program")

After the Council's report was released, the Premier had his officials and colleagues examine the report thoroughly and he provided a considered response to Council Chairman David Slater on June 12th, 1981, taking each recommendation in turn (Peckford 1981). While accepting a number of the recommendations, the Premier did not agree with recommendations that would have allowed the agglomeration of economic activity in urban areas. He stated,

"Government's clearly enunciated policy is to foster rural economic development in all communities. For many communities, the sole economic base is the fishery, and the northern cod stock is the most significant. Therefore Government's policy is that the fishermen residing in coastal communities adjacent to the resource should have first claim. Further, Government has put forward a deliberate policy to distribute the onshore impact of offshore oil and gas developments....Government does not endorse the Council's suggestion that economic activity 'should generally be located in one or two urban centres' within each major peninsula."

"The Province agrees that the Federal Government should expand and upgrade harbour facilitiess on both the east and west coasts of the Island. In so doing, however, the Federal Government must recognize provincial policy with respect to the railway, and their own constitutional obligations. Improvements should not be confined to one port in either the east or the west."

The Premier did not accept suggestions for alternative uses for the Gulf Subsidy:

"A large portion of the Gulf Subsidy is for rail freight. Without it, the railway would lose even further to competing modes, and the railway could not be improved as this Government believes it should. Goverment therefore finds the recommendation unacceptable."

The Council had suggested that migration be neither encouraged nor discouraged and that regionally extended benefits and differential eligibility requirements of Unemployment Insurance be reconsidered in that light. To this, the Premier replied,

"...With respect to employment... the Province believes that mobility policy should allow for interim affirmative action programs to give preference to locally unemployed persons. Government does not agree with reconsidering special regional Unemployment Insurance benefits...This program is a federal responsibility which the Province cannot permit to be weakened. The Council was not able to show conclusively that regional Unemployment Insurance benefits have any appreciable impact upon regional unemployment by encouraging the unemployed to stay in Newfoundland."

The Council had suggested that governments not force jobs into outports if such jobs would likely be more economically viable in larger urban centres within commuting distance of outport people. The Premier's response:

"The Province rejects the implication in this recommendation that rural areas are at some net disadvantage. Government believes that rural areas have unique advantages for certain types of economic activity, and that they offer for many people a superior way of life. It is convinced that viable opportunities can be found in most rural areas to maintain and improve the lifestyle to which our poeple have become attached."

# APPENDIX D

## URBAN STRUCTURE: MESSAGES FROM MOBIL'S ENVIRONMENTAL IMPACT STATEMENT*

### Hibernia's Possible Impact on Newfoundland's General Freight Traffic

A consultant to Mobil estimates that the inmigration of families (1,500 additional persons) to work on the Hibernia project may increase general freight by some 1.7 tonnes per capita, or 2,500 tonnes of imported goods per year. In addition, it is estimated that future well drilling activity will require about 2,500 tonnes of imported goods and material for each well.

Peak demands on the Mainland-Newfoundland transport systems may be about 30,000 to 35,000 tonnes per year probably distributed fairly equally among trucking, the railway, and the direct sea lanes to St. John's. During the peak of Hibernia development, general freight across the Gulf may increase by up to 25,000 tonnes per year--a four per cent increase over current volumes.

### Highways and Roads

Mobil is concerned about the ability to move truck and passenger traffic within the Avalon Peninsula:

> There are a number of very significant problems currently existing within the network of St. John's which must be addressed if even the normal growth of the city is to be accommodated in the near future. (EIS IV p 81, details are given.)

The Hibernia project will generate increased traffic, primarily on highways around St. John's, The Trans Canada Highway and Route 100 (Argentia Access Road). The Harbour Arterial Highway needs access ramps which are suitable for trucks. The Outer Ring Road would relieve traffic on congested road arteries in the western part of the St. John's CMA, unless its controversial route is relocated further away from the city. The Trans Canada Highway (TCH) needs to be upgraded to four lanes from the Foxtrap Access Road west to Roaches Line, a distance of 53 km.

Traffic on the TCH and Argentia Access Road (Route 101) will be about 20 percent greater. Up to 12 heavy transport trucks per day will travel to Argentia with similar heavy truck traffic to the Come-By-Chance area. However, the greatest traffic growth is likely to come from commuting workers, since, of the projected work force of up to1200 persons in 1990, 400 to 500 of which could be commuters.

Over the last 25 years, the Province has relied on Joint federal-provincial cost-shared programs for many new highways and improvements. The federal governmenthas contributed from 50 to 90 percent of construction cost, and the provincial government has contributed 10 to 50 percent plus all right-of-way costs. Clearly, the Hibernia project will need improved road and highway access in Eastern Newfoundland, and it will have the effect of unifying the economy of this region.

## St. John's Airport

Forty-eight percent of the provincial population (some 286 000 persons) are estimated to live in the St. John's airport catchment area. Efficient long distance air flight schedules are important in the oil business. The St. John's to Calgary and Houston routes have good flight schedules, but unfortunately the St. John's to London route, a key one for European destinations, has poor flight scheduling. (EIS IV p84)

## The St. John's Impact Area

This city and impact area has the only multi-purpose port on the Avalon Peninsula. In 1983 it opened a Dockyard Synchrolift so that it may now handle many of the drydockings that would otherwise have to go to Marystown. The Airport is a crucial staging area for offshore crews. New transportation routes being planned include the Trans Canada Highway widening, Conception Bay South By-pass, and the Goulds By-pass.

St. John's will be the centre of project management, engineering design, supply base operations (from Mobil Oil's Pier 22), and support for development drilling. About 3 925 person-years of employment are expected to be generated. Most of the employment is associated with development drilling. Few new workers will be needed to migrate to St. John's. Newfoundlanders currently fill about 65 percent of positions on drilling rigs active on the Grand Banks. Surveys indicate that approximately 75 percent of Newfoundland rig workers reside in the St. John's area. The main source of in-migration to St. John's is likely to be project management personnel since there is a shortage of experienced people in the St. John's area.

154 820 people were living in the impact area in 1981, 71 percent living in the urban core with some 76 percent of those choosing to live in the City of St. John's. The City of St. John's has been losing population (down 6 per cent in 1976-81) while growth in recent years has tended to occur in the Town of Mount Pearl and towns on the metropolitan finge, such as the Goulds and Paradise. The share of Newfoundland population living in the St. John's Impact Area has risen from 20.1% to 23.7%, 25.3%, 26.0% and 27.3% in the census years 1961 to 1981. Recreational and cultural services and facilities are highly concentrated in the St. John's metropolitan area, as are health services, with the result that the city serves as a focal point for many different spheres of activity, and must provide services to nonresidents as well as residents.

The 1981 labour force of the St. John's Impact Area was 71 400, an increase of 45 percent over 1971. The participation rate was 63.5 percent. This impact area accounts for about 32 percent of the provincial labour force.

Economic activity in St. John's is dominated by the service sector which accounted for 84 percent of employment in 1981. The secondary sector accounted for 13 percent of employment in the area. With its excellent harbour and established infrastructure,St. John's has become the supply and service centre for exploration on the Grands Banks, and to a lesser degree for exploration off Labrador. Exploration in the form of seismic surveys began in the early 1960's, with the first wells drilled in 1966. Between 1967 and 1970, activity was confined to seismic surveying. A period of intense drilling followed, with 39 wells completed between 1971 and 1975. Two to three rigs were active for most of this period. No significant discoveries were made on the Grand Banks, and although seismic work continued, drilling stopped for three years (partly the result of intergovernmental and company-government disputes over jurisdiction and the introduction of new regulations).

In response to the Council's suggestion that there be a centre for training and certifying workers for the offshore petroleum industry, the Premier replied,

"This recommendation is consistent with the Province's wish to establish an Institute for Fisheries and Marine Technology specializing in just such areas."

Whereas the Economic Council believed that productivity enhancement was important, the Premier was skeptical:

"...the means of achieving productivity enhancement are not readily apparent...the Council's recommendation to establish an advisory council on industry performance may be met through Government's proposed [and later implemented] Newfoundland Economic Council"

The Premier agreed with Council's suggestion to step up bioeconomic research into the fishery, noting that the Province wants to bias policy in favour of the Newfoundland inshore fishery. In his view,

"It should be pointed out that the people of the Province have pre-eminent claim to the fishery by historical right. Until the Newfoundland fishing industry has reached its capacity, there will be no surplus to be distributed among boats from other provinces. It is now clear that there is no part of the present catch which is surplus to domestic capacity."

The Province did not comment on most of the Council's fishery recommendations, pending the release of its own Royal Commission of Inquiry into the Inshore Fishery.

The above remarks highlight the main points of difference between the Premier and the Council report. Interested readers should read the entire 16 page mimeograph (Peckford, 1981) obtainable from the Newfoundland Government or the Economic Council of Canada.

Drilling resumed in 1979. Among the four wells completed that year was Hibernia P-15, Canda's first major offshore discovery. Over the next five years, about 25 wells were completed, none of these were appraisal wells on the Hibernia structure. At peak in mid-1984, five rigs were active, all supplied from bases in St. John's.

The number of business formations since 1979 has increased, about 275 businesses whose operations are wholly or mainly oil and gas-related have been formed in the past 5 years. Most of these 275 businesses are among the 350 companies listed in the Newfoundland Department of Development's Offshore Industrial Directory. Most are located in the St. John's Impact Area.

In 1983, expenditures on offshore exploration reached $440 million, up from about $180 million in 1979. The share of expenditures accounted for by goods and services produced in Newfoundland has steadily increased, reaching about 20 percent, or nearly $90 million, in 1983. Most of the income generated by these expenditures has accrued to the economy of the St. John's Impact Area.

EIS Table 2.2-4
Total Offshore Expenditures by Supply Company

| Year | Newfoundland Owned | Newfoundland Operated | Other | Total |
|---|---|---|---|---|
| | | ($millions) | | |
| 1979 | 11.0 | 105.1 | 65.2 | 181.3 |
| 1980 | 16.2 | 146.9 | 61.9 | 225.0 |
| 1981 | 31.5 | 204.5 | 99.2 | 335.2 |
| 1982 | 28.5 | 255.0 | 53.0 | 336.5 |
| 1983 | 37.7 | 331.9 | 41.7 | 441.3 |

Source EIS IV p27

## The Come-By-Chance Impact Area

Originally settled in the early 1800's by fishermen, it became the site of the 100 000 barrel per day refinery built between 1971 and 1973 with a peak work force of 1000 people, many housed in a local work camp. The refinery bankrupted and was mothballed in mid-1976.

The Come-By-Chance Impact Area includes the communities of Come-By-Chance, Arnold's Cove, Sunnyside, Southern Harbour, North Harbour, Goose Cove, Garden Cove, and Swift Current. For the purpose of the Environment Impact Assessment, the Bread and Cheese Islands and the Town of Clarenville (the principal service centre for the area) are also included in the Come-By-Chance Impact Area. Adams Head was designated by the provincial government for offshore petroleum -related uses and is "frozen" by the Development Areas Act for potential use as a concrete platform construction site.

Communities in this impact area have seen major changes in land use during their history. Large expansions took place during the 19670's (resettlement program for Placential Bay Islands) and the early 1970's (Come-By-Chance refinery). Closer of the refinery in 1974 saw abandonment of a newly-developed 50-home subdivision in Come-By-Chance and the evacuation of a large number of mobile homes from Arnold's Cove. At the current time, Clarenville is well prepared for expansion. Ample land is available for both residential and commercial-industrial development which is ieither serviced or serviceable.

The area is noted for its deep-water port and its proximity to rail lines, and major shiping lines. Economic activity is dominated by the service sector, which accounted for 55 percent of employment in 1981. The manufacturing sector is dominated by a phosphorus production facility in Long Harbour, which employs 400 persons ans spends more than $23 million anually on payrolls, goods, and services in Newfoundland. The plant shipped 45 000 tonnes of refined chemicals during 1980. The facility was completed in early 1968 at a cost of $50 million although additional expenditures brought the total investment closer to $100 million by 1978.

During the 1960's, the Come-By-Chance area, specifically Arnold's Cove, was a receiving area for people relocated unter the government resettlement program. In 1981, the population of the Come-By-Chance Impact Area was 17 700 or 3.1 percent of the total provincial population. The area grew rapidly and then declined in 1971-81 because of the growth, then closure of the oil refinery. 65 percent of the population lives in 52 small scattered communities. Clarenville is the local regional service centre. Clarenville was one of the first towns incorporated after Confederation (1951), it has an updated urban development plan. It is located on the juction of the Trans Canada Highway and the railroad. Its location allows it to serve communities on the north side as well as the south side of the ismus joining the Avalon Pensinsula to the main body of the island of Newfoundland.

The labour force of the Come-By-Chance Impact Area numbered approximately 6400 in 1981, an increase of 64.1 percent over 1971. The participation rate was 53.2 percent compared to the provincial average of 57.1 percent.

Employment opportunities in the Come-By-Chance Impact Area arise from construction of the Gravity Based System. During development, approximately 3 620 person-years of employment are expected to be generated, and employment is expected to peak at 2 265 persons in 1990.

The trades required for the GBS construction are similar to those required for a major civil works project such as a hydroelectric generating station. The minimum qualification for most trades would be journeyman-level training and experience. Census data and the results of a 1984 survey of construction unions indicate that between 500 and 1000 workers could be recruited from within commuting distance of Come-By-Chance. The remaining 1000 to 1500 would be accommodated in a work camp.

The Come-by-Chance Impact Area, essentially the Avalon Isthmus, extends from the Twon of Clarenville on the north, to the community of Long Harbour on the south. Clarenville (population 2878), Come-By-Chance (336), and Arnold's Cove (1184) will be most affected. The proposed Adams Head concrete dry dockyard is within 10 kmn of the communities of Arnold's Cove and Come-By-Chance refinery. The communities are about 145 km from St. John's along the TCH; and Clarenville is 45 km beyond. Clarenville is the regional service centre.

Crushed stone may come from the Goobies area. It is assumed that the supply of portland cement for the GBS would come from the North Star Cement Plant in Corner Brook. It would involve the minins of limestone and silica-bearing shale near Corner Brook, and gypsum at Flat Bay near St. Georges.

The Fixed Production System closely parallels that of developments such as the Bay d'Espoir hydro-electric project, the Upper Churchill hydroelectric facility, and the oil refinery at Come-By-Chance.

During the 1970's, the Come-By-Chance project attracted a large external work force of which an estimated 38 percent were returning Newfoundlanders. Similarly one-quarter of Newfoundlanders in the current petroleum work force indicated that their last job was outside the province. Among oil workers residing in the St. John's CMA, one-third had returned to the province specifically for work, while 16 percent of those outside the CMA had re-established residence in Newfoundland since their last job.

A retrospective study of the Come-By-Chance project (Felt and Carter 1980) showed that the proportion of foreign workers was not high in the early stages of the project. Newfoundlanders accounted for 94 percent of the construction workforce, the majority coming from within the impact region. Most of the in-migrant workers were in supervisory or management positions, and represented a very small proportion of the total construction workforce.

The Come-By-Chance oil refinery employed 1700 people at peak, increasing the resident population by 56 percent. Non-local construction personnel were housed in a tempaorary "camp"; an arraangement which restricted interaction between townspeople and workers.

In Argentia, the construction and operation of the American Naval Base provided a similar experience.

Clarenville has two modern shopping centres, other retail services, educational centres, as well as government and financial insitiutions. A new regional hispital is under construction and scheduled to open in mid-1985. There are plans for additional industrial park space and several office buildings with vacant space. Clarenville has major docks.

For historical reasons, Newfoundlanders are not very experienced in local government. Charters which prohibited settlement began in 1634 and were not completely abolished until 1824. The provincial government has now introduced the Municipalities Act and the Municipal Grants Act by which it redisigned the entire framework of local taxation and introduced a new system of grants based on a combination of need and incentive. Due to the relatively short history of municipal government in Newfoundland, elected municipal officials have limited experience with self-government, and the tax base and financial resources needed to make local improvements are scarce. Factors, such as a typically small population base and attitudes of the local citizens, limit the ability of local governments. However, the resistance to property tax (an innovation almost unheard of before the Municipalities Act) is gradually eroding and interest in municipal planning and development control is increasing, partly due to the inducements offered by the Municipal Grants Act. Efforts to establish regional government, however, have not been successful, and the level of interest does not appear to be increasing. (EIS IV p 139).

Clarenville, however, is an exception. It was one of the first Communities to Incorporate as a Town after Confederation (1951). Of the five municipalities in the Come-By-Chance Impact Area, only the Town of Clarenville has an up-to-date municipal plan and development control regulations as required under the Urban and Rural Planning Act. In most cases, municipal planning was first undertaken in response to the construction of the Come-By-Chance oil refinery.

## The Argentia Impact Area

Argentia is a very old port, used by the Portugese in the 1500's as a summer fishing station, which became a permanent fishing colony in 1662. In 1713, it was ceded to the English under the Treaty of Utrecht. By the mid-1700's, Placentia had become the second largest community in Newfoundland and an important, prosperous fishing centre. However, during the 1800's, the fishery declined in importance and did not recover until the late 1800's. During both the Second World War and well into Confederation, the economy of the area depended heavily on the operation of the American naval base at Argentia. The base provided employment for as many as 3000 to 4 000 civiliams, making it by far the largest employer in the area. Operations at the base were curtailed in 1970 and most of the military personnel were withdrawn; however, the physical facilities were left. The Placentia-Argentia area was an official receiving area for people relocated under the government resettlement program.

67 percent of local employment is in the service sector, including transportation and public administration. What local people are employed in manufacturing actually work at Long Harbour or St. John's.

Its deep, ice-free harbour has occasionally been used as an alternate base for offshore explorations when St. John's is closed by ice. From mid-June to mid-September the CN Gulf Service operates a Roll-On-Foll-Off (Ro Ro) ferry between Argentia and North Sydney, Nova Scotia. It still has the U. S. Naval Base airport and buildings.

Although Argentia has a Ro Ro facility, cargo throughput is slight, normally 10 000 to 25 000 tonnes per year. Its airport has three runways, but runways need resurfacing and all lighting has been destroyed. It is the alternate helicopter airport for St. John's,130 km or 45 minutes away.

The Argentia Impact Area had a 1981 population of 10 373 scattered in 15 relatively large communities (by comparison with the 52 communities for the Come-By-Chance Impact Area) and a labour force of 3 800 with a 52 per cent participation rate. Only 37 percent of the population lives in places of less than 1000 inhabitants (by comparison to 65 percent for Come-By-Chance).

Employment opportunities in the Argentia Impact Area arise from flowline fabrication, and deck and topsides assembly and hook up. For the Fixed Production System, 1,960 person-years of employment are expected to be created in the Argentia Impact Area; approximately 1,335 person-years for topsides and assembly and out-fitting, and 625 person-years for flowlines. Employment for outfitting the topsides is expected to peak at about 1,200 persons in 1989. The trades required are mechanical and electrical at the journeyman-level training and experience. About 300 to 500 workers could be recruited from within commuting distance of Argentia for outfitting the topsides. The remaining 700 to 900 workers involved in topsides outfitting would be accommodated in a camp.

## Housing and Real Estate Values

Within the city of St. John's, proportionately more multiple units that single family unit housing has been built while single family units tend to dominate the surrounding suburbs. Shortly after the announcement of the Hibernia discovery, housing starts in 1979-80 increased in the St. John's area by 84 percent. Increased levels of construction, as indicated by housing starts, continued from 1980 until mid-1981. At that time the housing market received a strong correction due to record high mortgage rates, an oversupply of residential units, reduced market values, increasing vacancy rates, and reduced optimism in future housing demand from oil development. Housing starts dropped by 43.4 percent from 1981 to 1982 (table 2.5-3) and the number of building material supply firms decreased by 40 percent, from 46 in 1979-80 to 28 in 1981. By 1983, housing starts has shown marked improvement.

The market price of residential housing in the St. John's CMA has experienced considerable growth and change over the past decade (EIS Table 2.5-4). During the period 1979 to 1980 there was a 23.6 percent upsurge in the average sales price of units within the CMA. Over the next two years, market prices declined because of oversupply and overpricing. However, during the period from late 1982 to 1984, the market adjusted upwards with the number of units sold increasing by 50.9 percent and the average price increasing to $64,434.

EIS Table 2.5-4
Multiple Listing Service Real Estate Activity, St. John's CMA, Single-Detached Units: 1975 to 1984

| Year | Number of Units Sold | $ Value (000) | Average Selling Price | % Annual Increase in Selling Price |
|---|---|---|---|---|
| 1975 | 188 | 6 690 | 35 585 | n/a |
| 1976 | 249 | 9 957 | 39 988 | 12.4 |
| 1977 | 382 | 15 530 | 40 655 | 1.7 |
| 1978 | 334 | 14 428 | 43 199 | 6.3 |
| 1979 | 415 | 18 621 | 44 870 | 3.9 |
| 1980 | 495 | 27 457 | 55 469 | 23.6 |
| 1981 | 540 | 31 523 | 58 375 | 5.2 |
| 1982 | 852 | 49 315 | 57 881 | -0.8 |
| 1983 | 1234 | 78 376 | 63 514 | 9.7 |
| 1984 | 1286 | 82 762 | 64 434 | 1.5 |

Source: EIS IV p66.

## New Table D-1
## Historic Real Estate Values for a Two-Storey Detached House, St. John's, Ottawa, Calgary and Edmonton

| Date | St. John's[1] West | Ottawa[2] South | Calgary[3] | | | Edmonton[4] Petrolia |
|---|---|---|---|---|---|---|
| | | | Varsity | Oakridge | N.E. Properties | |
| | | | ($ 000's) | | | |
| July 1985 | 122.5 | 160 | 160 | 135 | 99.5 | 120 |
| Jan. 1985 | 108.7 | 165 | 146 | 128 | 97 | 118 |
| July 1984 | 106 | 170 | 145 | 132.5 | 105 | 125 |
| Jan 1984 | 98.5 | 165 | 159 | 132.5 | 105 | 128 |
| Fall 1984 | 106 | 168 | 145 | 130 | 97 | 121 |
| Fall 1983 | 98.5 | 160 | 165 | 140 | 107 | 130 |
| Fall 1982 | 95.5 | 130 | 170 | 165 | 126 | 132 |
| Fall 1981 | 105 | 120 | 205 | 210 | 143 | 145 |
| Fall 1980 | 105 | 91.5 | .. | .. | 129 | 143.5 |
| Fall 1979 | 86.5 | 89.5 | .. | .. | 115 | 141 |
| Fall 1978 | 79.8 | 89.95 | .. | .. | 97 | 128.5 |
| Fall 1977 | 76.5 | 89.95 | .. | .. | .. | 115 |
| Fall 1976 | 77 | 89.5 | .. | 119 | .. | 106 |
| Fall 1975 | 79 | 79 | .. | 86 | .. | 90 |
| Fall 1974 | 76 | 72 | .. | 75 | .. | 78 |

Source: *Royal LePage Survey of Canadian House Prices*, Royal LePage Real Estate Services Ltd., Toronto, Summer 1985.

1. Data are St. John's to 1980, then St. John's West.
2. Data are Ottawa City to 1980, then Southern Ottawa to 1985.
3. Data are Calgary City to 1976.
4. Data are Edmonton City to 1976, then the district of Petrolia to 1985.

## New Table D-2
## Number of Final Orders for Foreclosure, Alberta

| Region | Prior to 1980 | 1981 | 1982 | 1983 | 1984 | 6 Mo. to June 85 |
|---|---|---|---|---|---|---|
| Alberta | few | 626 | 1143 | 3869 | 8023 | 5512 |
| Edmonton | few | 420 | 705 | 1898 | 3581 | 2423 |
| Calgary | few | 147 | 323 | 1591 | 3958 | 2772 |
| Calgary Stock of Single Family Units, April | | 110,237 | | | 122,269 | 125,000 est. |

Data produced by Court of Queens Bench, Goverment of Alberta.

Note: Unlike other provinces, Alberta foreclosure laws (emanating from agricultural foreclosure experience in the 1930's) do not allow lenders to garnish incomes or seize other assets of people who default on their mortgages.

In trying to understand the possible impact of oil development on a city's property values, it is instructive to turn to the experience of Alberta. The volitile experience of both St. John's and Alberta house prices and migration in the past five years present a picture that is in dramatic contrast to the mild impacts suggested in the Enviromental Impact Statement (See New Tables D-1 andD- 2). These data contrast the tremendous volatility in house prices in cities dominated by oil incomes interacting with intergovernmental disputes over oil revenues, by comparison to Ottawa which is dominated by federal government employment. Notice that St. John's house prices leapt during the year Hibernia was discovered, only to fall back again when development did not occur. In the 6 months during which the Atlantic Accord was signed (1985), St. John's house prices rose 12.7%.

In Calgary, house prices moved from near parity with Ottawa in 1974 until a two-storey house in Calgary exceeded Ottawa by a wide margin of some $85,000 (about 70%) at the peak of speculative pressure in 1981. Then, with the signing of the September 1st, 1981 Energy Price and Taxation Agreement (when Alberta was forced to accept the Petroleum and Gas Revenue Tax), the decline of the world oil prices, and the outbreak of the world recession of 1982, Calgary and Edmonton house prices plummeted (as some 5% of the population left the province) until Ottawa house prices exceeded Calgary levels by some $25,000 (about 17%). After the signing of the Western Accord, Calgary house prices began to recover so that the parity that existed in 1974 seems to have been approximately restored in the mid summer of 1985.

The mortgage foreclosure data (New Table D-2) are presented, not so much to demonstrate the ease of walking away from a mortage in Alberta, but to demonstrate that thousands of families completely lost the equity they had in their homes during the collapse of Alberta house values. The number of foreclosures from 1981 to the first half of 1985 (including a lot of condominiums as well as detached houses) adds up to some 7% of the stock of single family units in Calgary.

The central message is this: If the development of the Hibernia Project is not well managed, the potential for speculative booms and busts in the St. John's housing market is daunting. Although the Hibernia Environmental Impact Statement claims that the small amount of employment involved need not have much impact on net population movements and that marginal investments in additional housing should allow the Hibernia development to have very little effect on inflation and property values, the above house price experience in St. John's and Alberta demonstrates that there is great potential for wreaking havock with the net worth of thousands of individual home owners.

## Impacts on Demography

The Environmental Impact Statement treats migration much as if the company were managing the provincial economy like a work camp: there are only so many jobs to be filled; there is a need for modest in-migration of certain skilled people during the peak of construction, and a need for modest out-migration afterward. The total numbers of people who need migrate into the impact areas is less than 1000 persons. In reality, migration is strongly motivated by hopes of receiving jobs and high incomes, even if the prospects are poor. Evidence from other migration studies (Winer & Gauthier) and the experience of Alberta suggests that the amount of "speculative migration" as the EIS calls it, may be substantial.

The Environmental Impact Statement has little to say about "speculative migration" and concentrates on the migrants who are needed to work on the Hibernia development and other related employment. In the population scenario without Hibernia, Newfoundland population is foreseen to grow 9.7 percent between 1985 and 2006 (EIS Table 4.5-4).

In order to assess the population increase "expected" (desired by the project managers) to occur during the development of Hibernia, a series of calculations were made. First, estimates were obtained of the number of new jobs that might be created during the project. It was assumed that all of those jobs generated directly by the development would be new jobs (for the purpose of assessing demographic changes) while much of the indirect and induced employment would be absorbed by the existing excess capacity in the Newfoundland economy. These assumptions, together with employment multipliers (1.3 for St. John's area and 1.1 for Come-By Chance Area) derived from development experiences in the North Sea and elsewhere, were then used to calculate the total number of new jobs likely to be created by the development of Hibernia. Published data on indirect multipliers for the Newfoundland economy (1974) show indirect multipliers for 33 sectors ranging from 1.051 to 2.683, the mean being 1.44. Empirically derived multipliers from the Grampian Region in Northeast Scotland (1980) have shown an estimated indirect multiplier of 1.7. But the Grampian Region economy is significantly more diversified than that of Newfoundland, and that this multiplier is based on a narrower definition of direct employment. (EIS IV Appendix A) (Note the implicit employment multipliers of 1.1 and 1.4 used by Atlantic Consulting Economists Ltd. in the EIS demographic calculations are dramatically smaller than the 3 to 3.5 multiplier implicit in Informetrica's estimate of the macroeconomic employment impacts of Hibernia.)

Second the estimates were made of the number of jobs likely to be filled by Newfoundlandeers, and those likely to be filled by people from elsewhere. Of those jobs filled by Newfoundlanders, estimates were made of the number of employees who would either be living in the local impact areas or within commuting distance, and the number who might move into the area.

Third, estimates were made of the proportion of married in-migrant workers (including their average family size), and single in-migrant workers. Estimates of the total population added to each impact area through the development were then made by summing the population (workers and families) expected to move into each of the areas.

Using these assumptions, the authors calculate an expected (desired) in-migration of up to 564 people in the peak employment year (1989). They calculate a peak return migration of 1091 people from Newfoundland to the rest of the world in 1991 when the peak construction phase has ended. The cumulative addition to the Newfoundland population peaks 1,410 people in 1990 which stabilizes at a new addition of 567 people after the surplus (unwanted) workers return to the rest of the world when the construction ends. At no time does the (desired) population increase by more than 0.23 percent.(EIS Table 4.5-4)

This (desired) in-migration to St. John's is expected to peak at 511 persons in 1992, but there is no large return migration forseen from St. John's, so there should be a permanent increase in the city's population by some 1607 persons (never more than 0.89 percent of the population).

In the Come-By-Chance area, 80 percent of the in-migrant labour force required for construction activities will live in a fully serviced and self-contained work camp near the construction site at Adams Head and would return to their homes at the end of each work cycle. The short time span of the Hibernia-related work in the area should (the authors apparently hope) provide little incentive for non-local workers to move permanently into the impact area. Total growth due to Hibernia between 1986 and 1990 is expected to be about 1830 people (o percent of the 1990 population) and approximately 1,470 of those people residing in a work camp. As the project is completed, it is assumed that workers will leave and that by 1992 all in-migrant employees will have left the area. With the majority of the employees housed on site, the demographic impacts are expected to be short-term and localized.

In Argentia, most of the work is also of a temporary nature, so individuals are expected to commute home on a periodic basis during the life of the project, and leave permenently once their work is completed. By 1989, about 960 migrants (workers and families) are expected to be in the area, representing about 9.0 percent of the population. Approximately 80 percent of that population is expected to reside in a work camp. Resident in-migrants (who do not live in the work camp) should constitute no more than 191 people (1.93 percent of the local population) in the peak year of 1989.

The Newfoundland Statistical Agency believes that 50 percent of Newfoundland out-migrants return home within 5 years. It is likely, therefore, that former Newfoundlanders would account for the bulk of speculative job-seekers coming to Newfoundland during the development of Hibernia. In addition, we can expect that many Newfoundlanders who would otherwise migrate out for jobs, may stay in Newfoundland if Hibernia is developed.

Keeping the total number of in-migrants within levels which local communities can absorb could be accomplished in two ways; recruitment policies could be implemented which stress local hiring, and recruitment could be done in such a way that speculative in-migration is doscouraged. In addition, recruitment of non-local employees could take place outside of the local impact area, theredecreasing the need for potential employees to travel to the impact area to find out if a job is abvailable. Advertisemtent and communication of employment requirements could also be done in a way that portrays job opportunities realistically, thereby minimizing the misinterpretation of job prospects and discouraging speculation.

Reduction of the demands placed upon local communities by workers moving into the impact areas could be accomplished through the maintenance of a fully equipped, self-contained work camp for temporary construction staff, and by enabling workers to remain in their home communities, if they so choose.

## Housing

The above expected (desired) levels of migration have been used in the EIS to generate measures of the demands for housing in the various impact areas. Canada Mortage and Housing has provided estimates of the numbers of persons per household for St. John's (ranging from 3.34 to 2.88) in 1985 to 2005. Using these ratios, the EIS authors estimate that their "expected" in-migration will add up to a maximum of 230 new households to St. John's in the peak year of 1992, and that this will form some 14.8 per cent of the new household formations in the city in that year. The overall conclusion is that the in-migration will be (or could be in the absence of "speculative migration") small relative to the total population and to the total amount of housing needed. Nevertheless, a 10 to 15 percent short run addition to the demand for new housing could cause quite a jolt in the local construction market if it were not anticipated. (The publication of the EIS Statement itself should do a lot to give people realistic expectations and therefore help to diffuse overoptimism).

Nevertheless, the EIS Statement is not realistic with respect to house prices. It says "Since the housing requirement forecast for the Hibernia Fixed System will not create substantial additonal deman, neither land nor house prices are expected to increase significantly as a direct result of the demands of the development. As I have shown with the Real Estate information on the huge price fluctuations and mortgage foreclosures that have been experienced in Alberta, and the dramatic house price fluctuations that St. John's has already experienced (before there has even been a confirmation that Hibernia development will take place!), the EIS Statement is probably quite naive in its hope that house prices will remain stable and that "speculative in-migration" will be avoided. Some new calculations based on Economist's models are needed. Also, a different mind set is needed concerning migration; in-migration should not be viewed as having unneeded persons in the work camp; it should be regarded as having a larger economy--a larger market to serve--which can lead to modest agglomeration economies and some economic development. It is possible that a successfully managed Hibernia Development will indeed cause in-migration of a much larger order than the EIS authors foresee, but that the influx of new population will bring enough new market with it to create some jobs of their own. Then, the advent of a better skilled workforce after Hibernia may create some opportunities to produce more home goods and exportables after the oil pool has passed its peak production.

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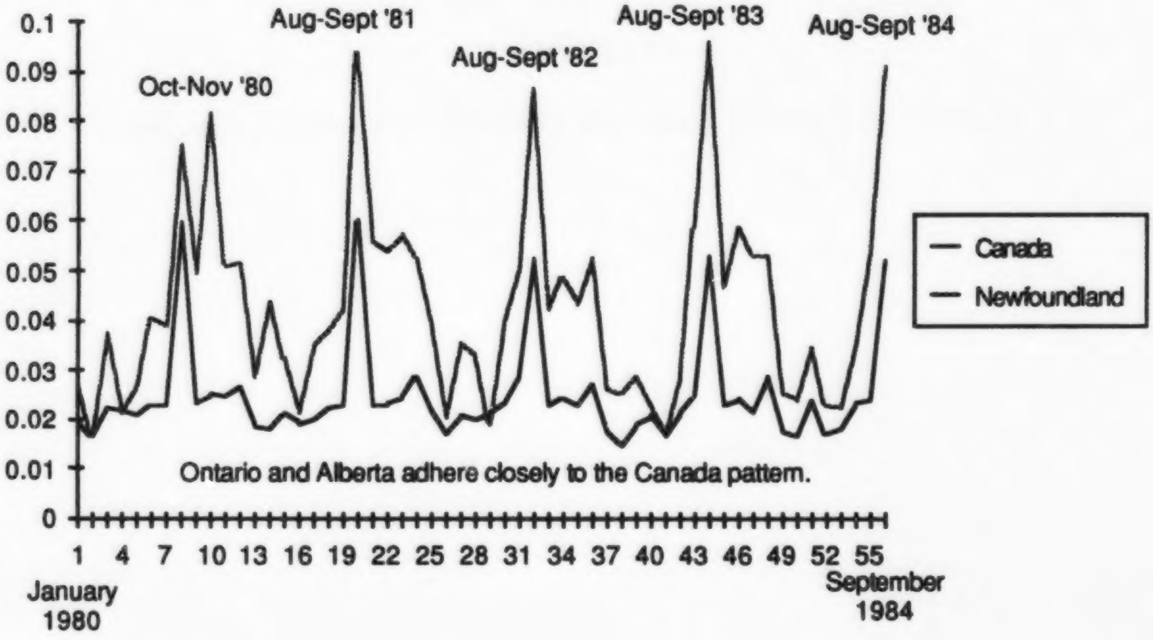
## Notes

* Much of the material in the first part of this appendix is taken from Mobil Oil Canada, Ltd. (1985) *Hibernia Development Project: Environmental Impact Statement*, Volume II: Project Description, and Volume IV: Socio-Economic Assessment. This material is provided as a convenience to those readers who may not have ready access to Mobil's report.

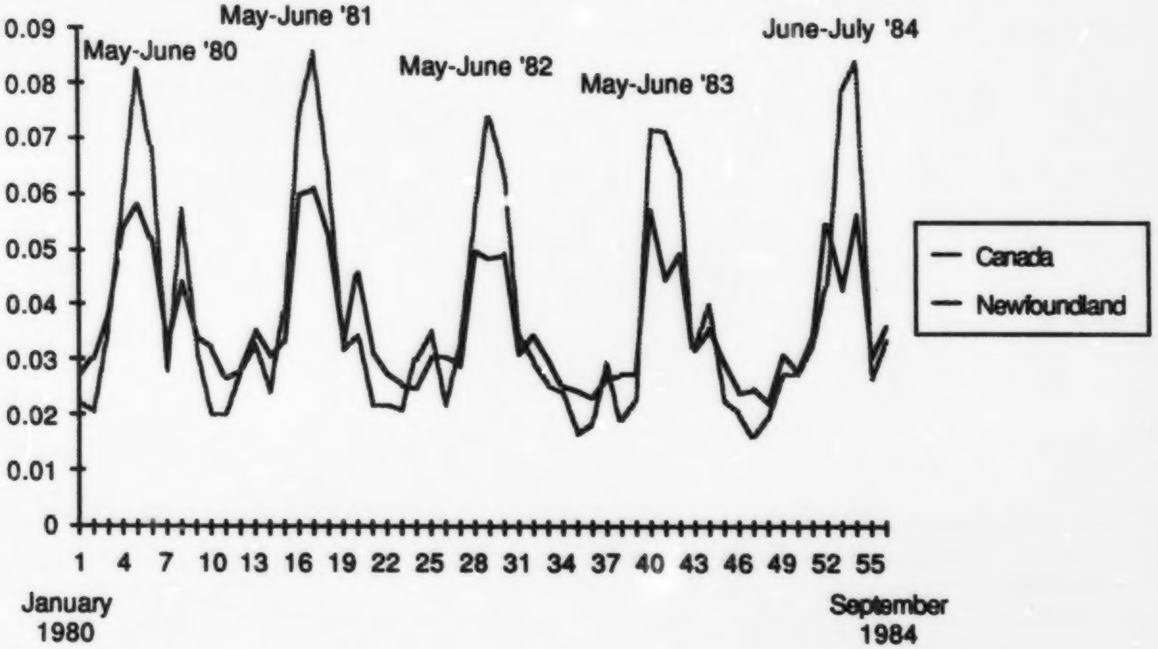
# APPENDIX E

# CHARTS SHOWING LABOUR MARKET FLOWS, 1980-1984

**Chart E-1**
**Proportion of Employed Persons Leaving Labour Force**
**By Month, 1983**



## Chart E-2
## Proportion of Persons Not in Labour Force Moving Into Jobs by Month, January 1980 Through September 1984



## Chart E-3
## Proportion of Unemployed Persons Finding a Job Each Month Canada and Newfoundland, January 1980 To September 1984

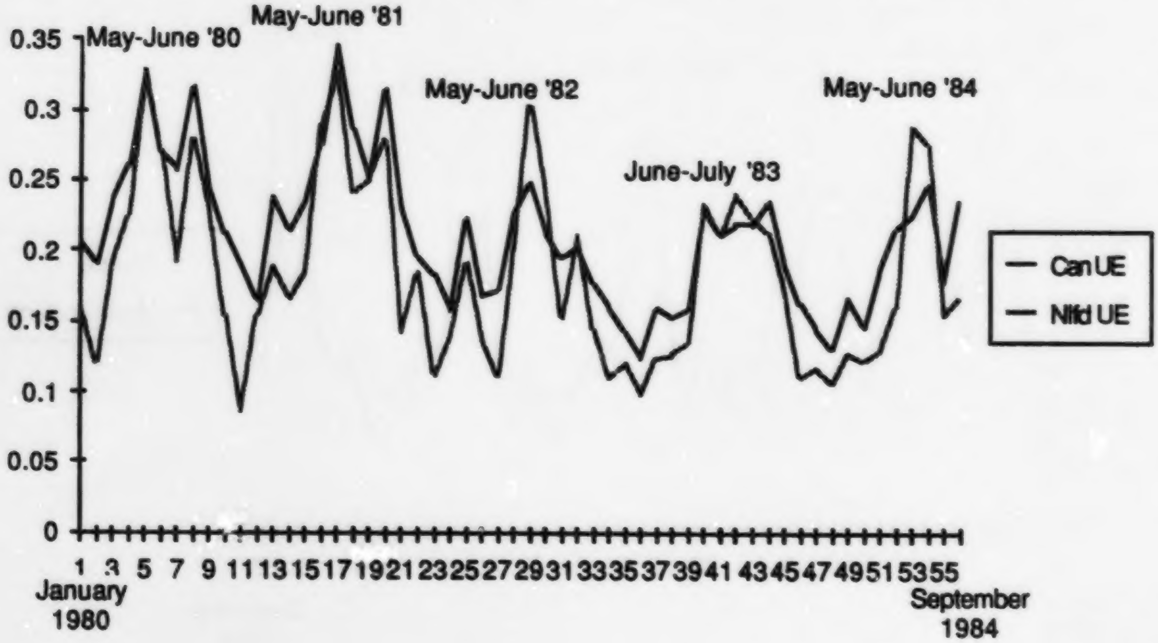
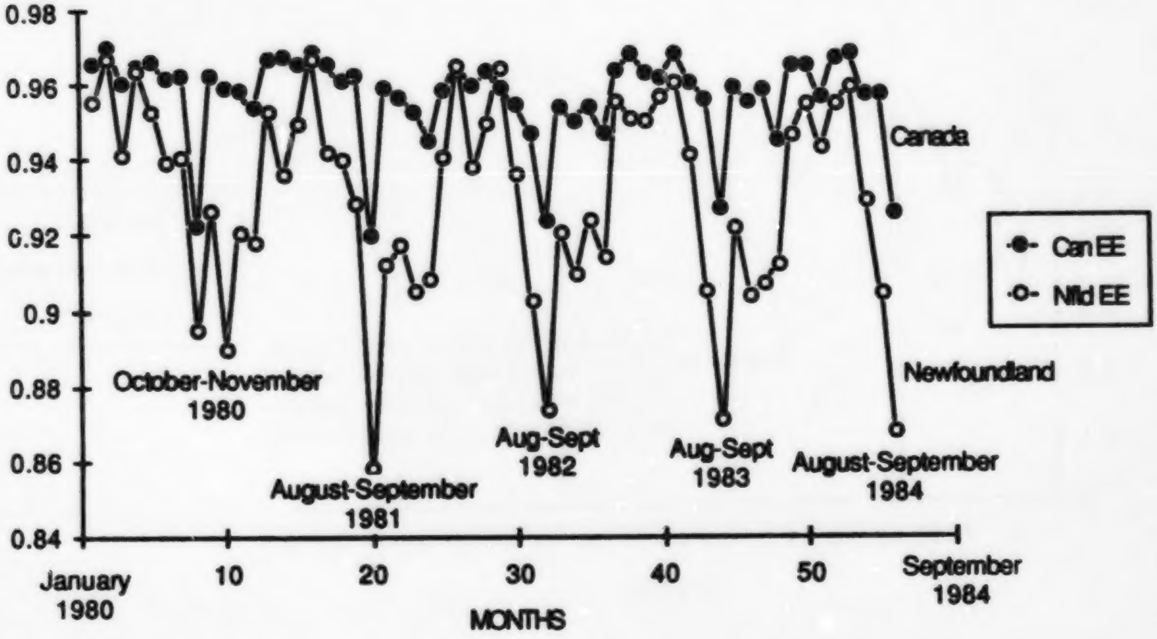


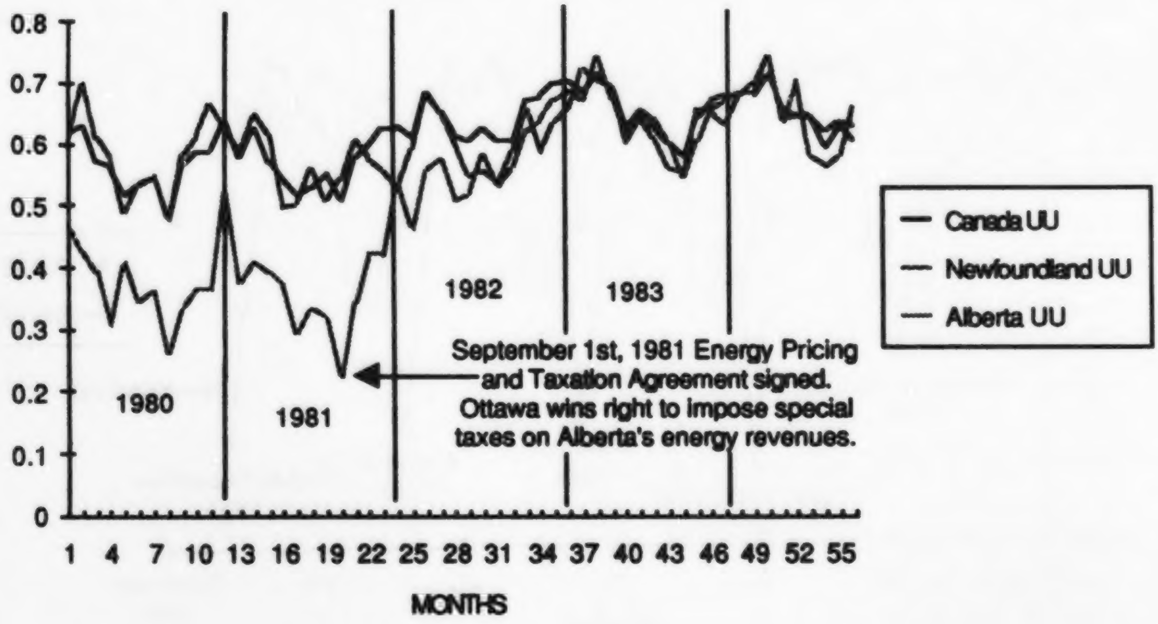
Chart E-4

## Chart E-4
## Proportion of Employed Workers Who Kept Their Jobs From Month to Month, 1980-1984



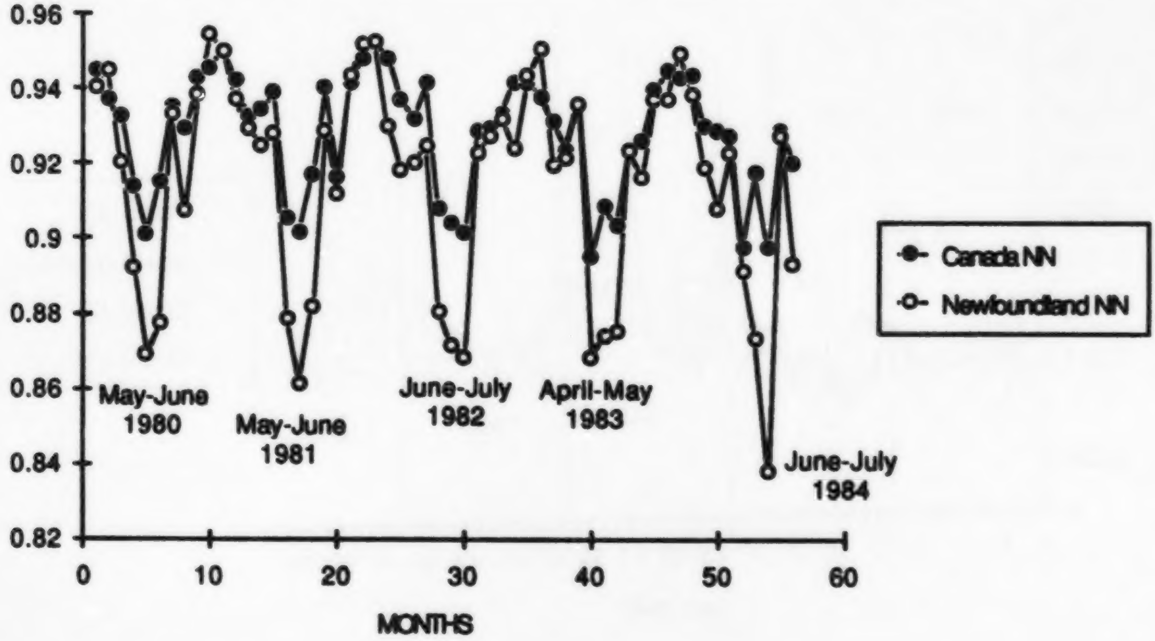
## Chart E-5

**Chart E-5**
**Proportion of Unemployed Workers Who Stay Unemployed From Month to Month, 1980.1-1984.9**



## Chart E-6

**Chart E-6**
**Proportion of Persons Outside the Labour Force**
**Who Stay Out From Month to Month, 1980.1-1984.9**



# Chart E-7

**CHART E-7**
**Proportion of Employed Persons Who Move Into Unemployment From Month to Month, 1980.1-1981.9**

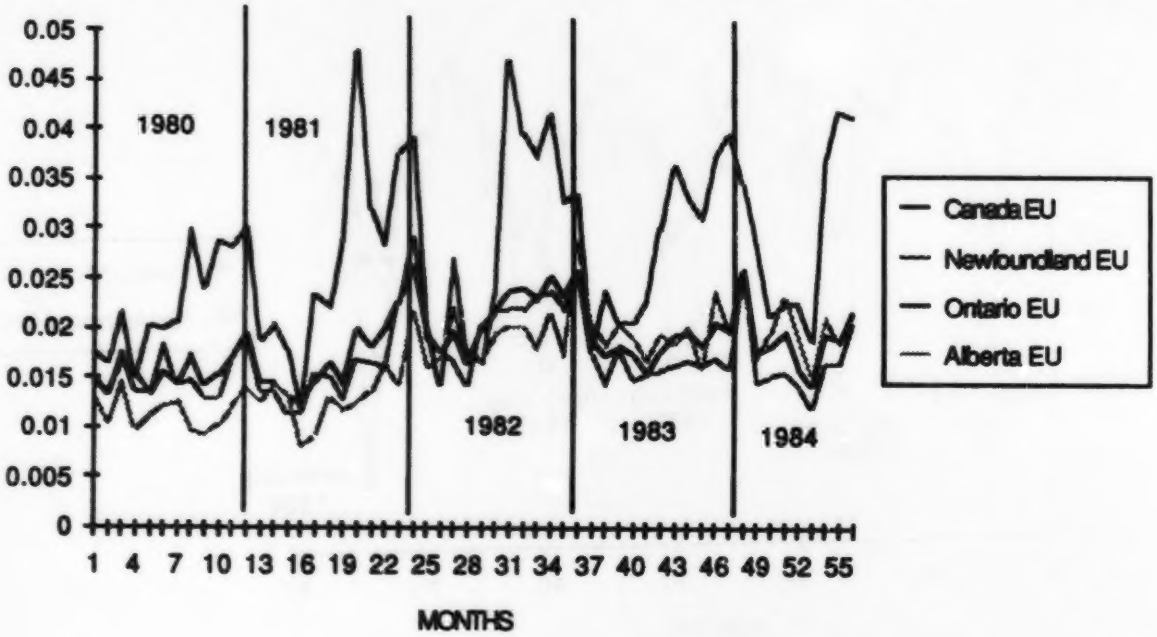
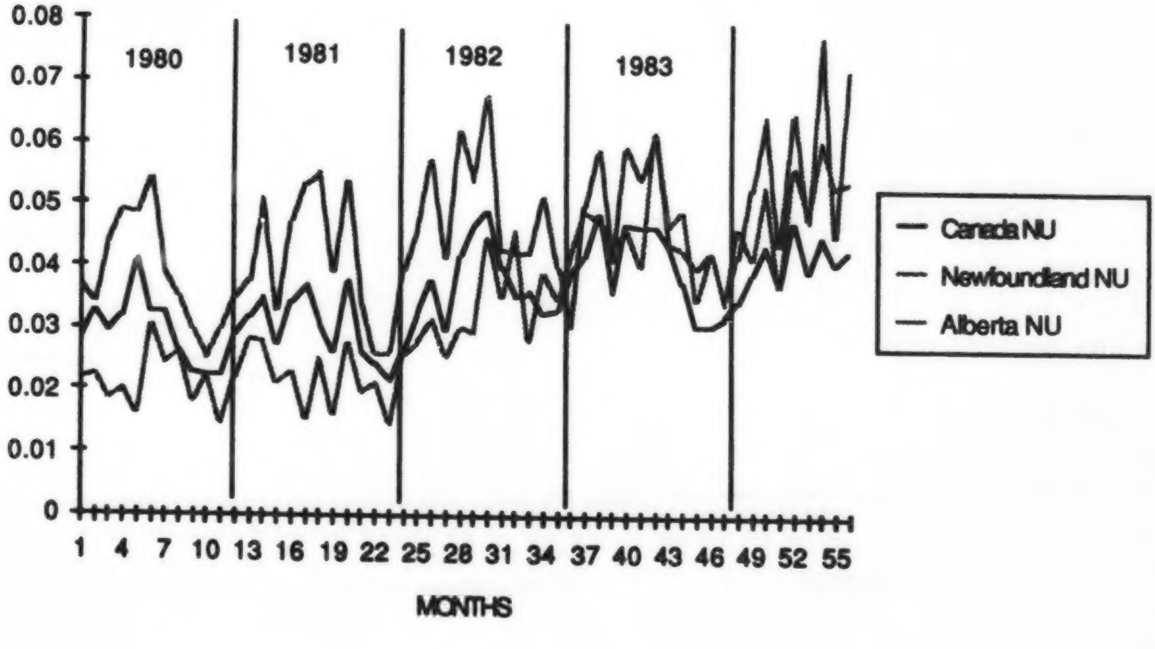


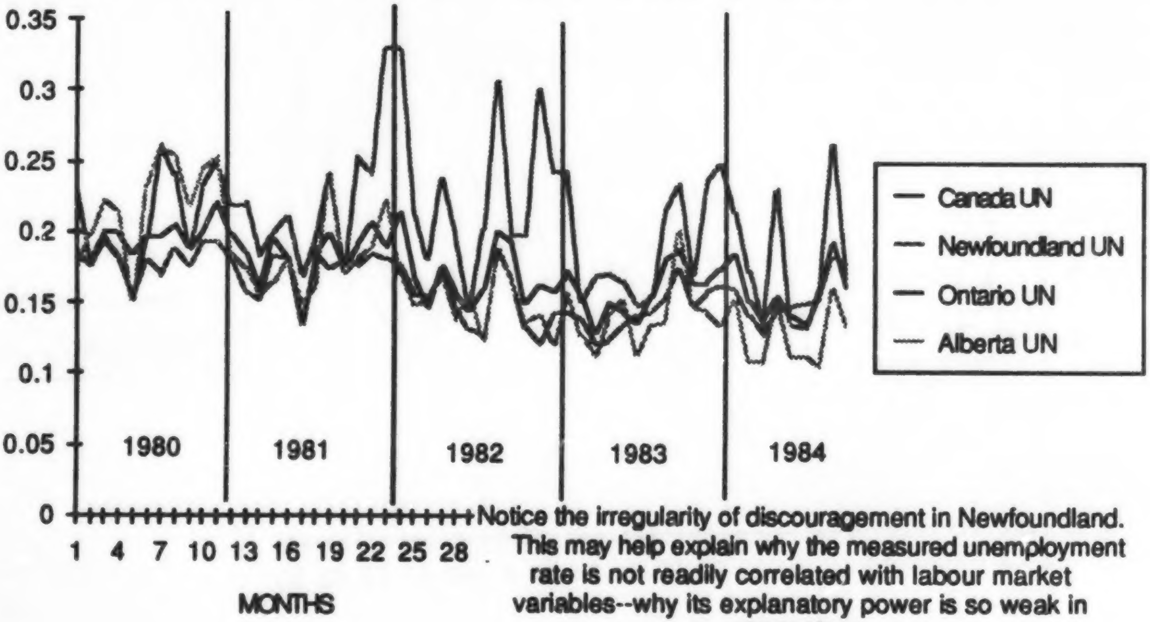
Chart E-8

## Chart E-8
## Proportion of Persons Outside the Labour Force Who Start Looking for Jobs, 1981.1 - 1984.9



# Chart E-9

**Chart E-9**
**Proportion of Unemployed Workers Who Give Up and Leave the Labour Force, 1980.1 - 1984.9**



Notice the irregularity of discouragement in Newfoundland. This may help explain why the measured unemployment rate is not readily correlated with labour market variables--why its explanatory power is so weak in regressions.

# APPENDIX F

## A MODIFIED SCHAEFER MODEL FOR 2J3KL COD

The reader is cautioned that the current appendix must be interpreted as an illustrative example of work in progress--work that could not be completed before this discussion paper had to be turned in to meet a deadline.[1] The current excercise illustrates the concept of optimal economic yield and demonstrates how it is influenced by changes in the productivity of fish harvesting, the landed price of raw fish and costs per trawler day.[2] The tentative measurements illustrate tentatively important policy conclusions--that the 2J3KL Cod Fishery is probably still being over-exploited, and that the fishery might well be capable of generating tens of millions of dollars of economic rent annually, if fishing effort could be reduced. While these ideas are not new, the author is not aware of any measures of how large these latent economic rents might be. Furthermore, fishery policy as documented in Chapter 6 does not seem to pay any attention to the fact that such rents could exist. This appendix illustrates how the author believes such measures of economic rent can be obtained.

Just prior to the deadline for this paper, the author received some new biomass data for 2J3KL Cod, measured at January 1st of each year (Chart F-1 and Table F-3). These were used in an illustrative regression which raises some doubts about how we are to interpret the data during the years just prior to Canada's decision to extend its fisheries jurisdiction. The remaining calculations in this appendix have been made with an earlier regression based on average biomass data which is less appropriate for the exercise. The author also hopes to improve on the trawler productivity regressions reported below. Better data for them may also be available. While each modification of data does change the calculations somewhat, the basic message is the same as that portrayed in the theoretical Figure 6-2 and the fitted model shown in Figure 6-5 and Chart F-4.

Data on 2J3KL Cod and some information on groundfish in North Atlantic Fishing Organization (NAFO) subareas 2-4 (see Map 6-1) were obtained from the Department of Fisheries and Oceans, St. John's. The underlying economic theory is spelled out in Munro (1980). The annual growth of the cod stock was estimated as the change in biomass from one year to the next, plus the amount of fish harvested (Chart F-1). The data portray a rather unusual history, especially during the period 1971 through 1977 when there was a dramatic international struggle over the common property resource that resulted in the near destruction of the fishery before Canada unilaterally declared extended fisheries jurisdiction out to the 200 mile limit, effective January 1st, 1977. A simple quadratic growth curve does not fit these data well because it cannot explain the peculiarly low growth rate during the last years when the stock was under international jurisdiction, and the peculiarly high growth rate when it was under Canadian jurisdiction. If one hypothesizes that competing nations exploiting 2J3KL Cod seriously under-reported their true catches during 1971-74 (or that unspecified biological factors explain the poor growth during those years), then one gets the following regression:

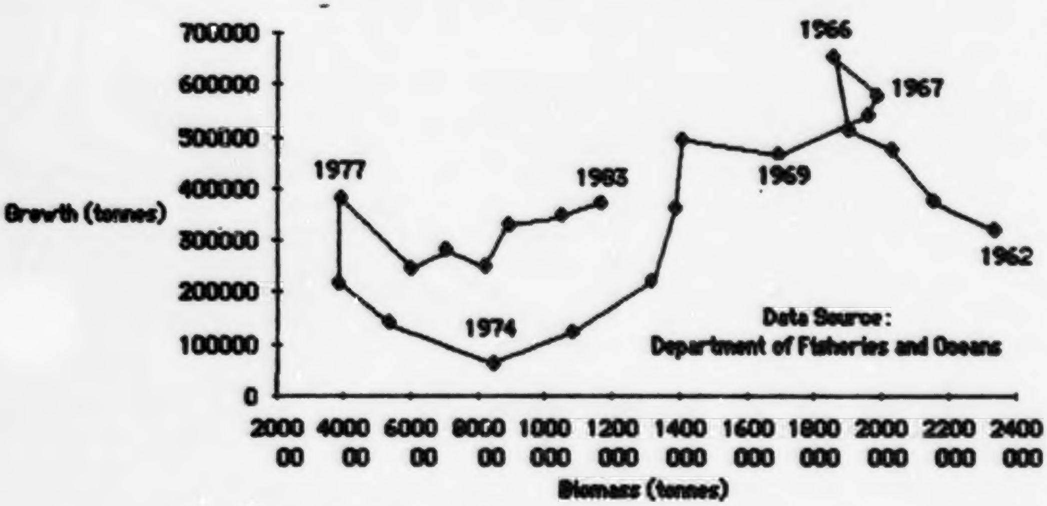
$$\text{Growth} = -13839 + 0.5541\ \text{Biomass} - 1.528\text{E-}07\ \text{Biomass}^2 - 224084\ \text{Dummy}_{71\text{-}74}$$

$$(t) \quad (-.13) \quad (2.78) \quad (-2.05) \quad (-3.83)$$

$$\bar{R}^2 = .63 \qquad F = 13.00 \qquad DW = 1.14$$

The low-growth hypothesis or under-reporting the annual fish harvest (by some 224,000 tonnes per year from 1971 to 1974) is not rejected. With such an hypothesis, the Schaefer

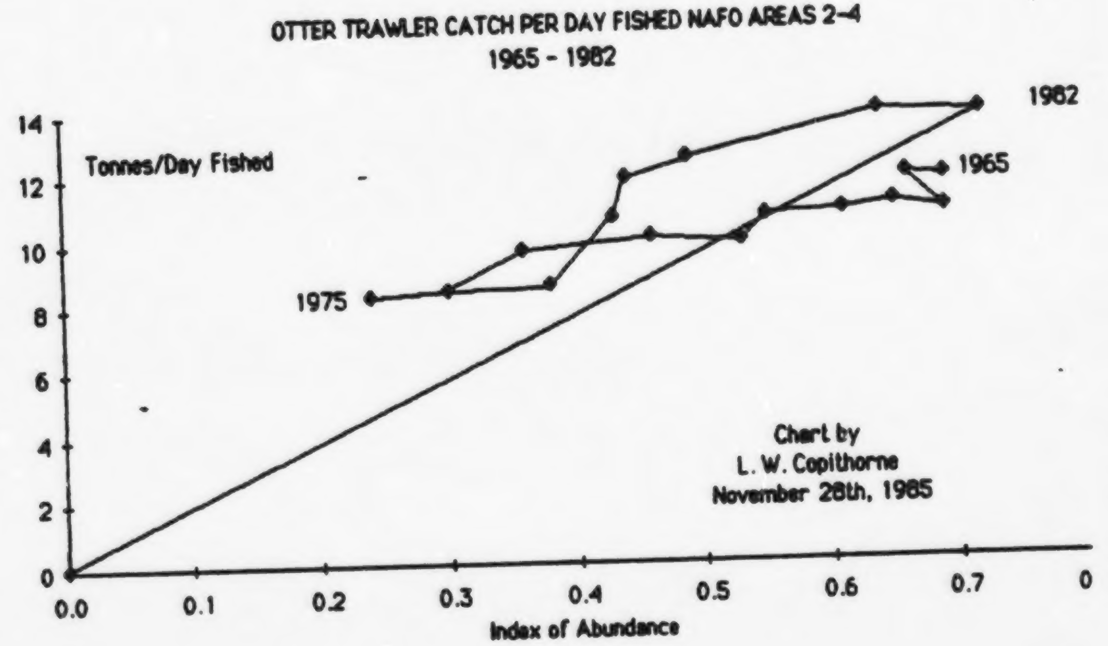
CHART F-1
GROWTH OF CODFISH AS A FUNCTION OF BIOMASS



Data Source:
Department of Fisheries and Oceans

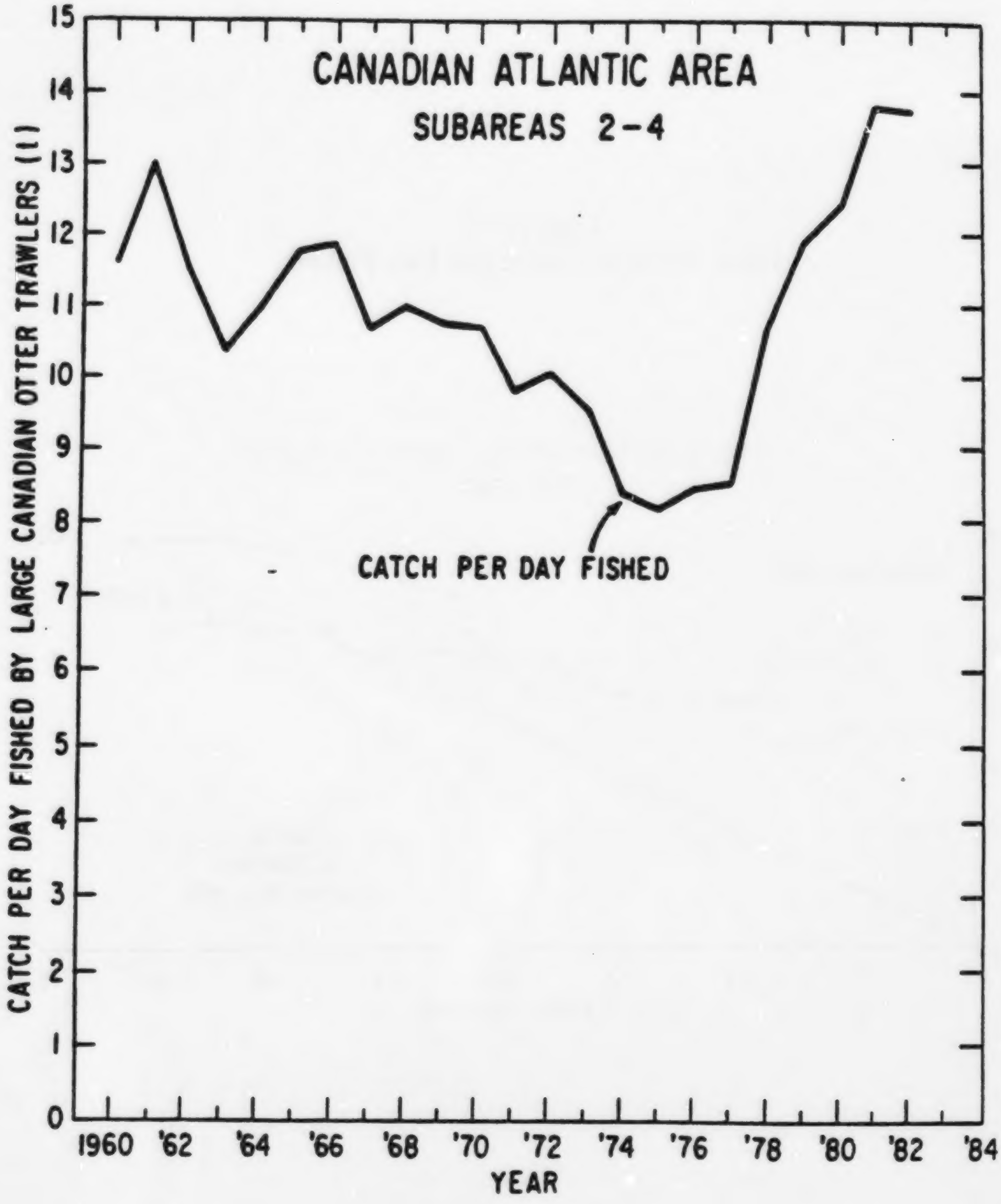
Historic Catch of Atlantic Cod Relative To Abundance, NAFO Areas 2-4, 1965-82

## Chart F-2
## Otter Trawler Catch per Day Fished



Source: Dept. of Fisheries Oceans, P.O. Box 5667 St. John's A1C 5X1

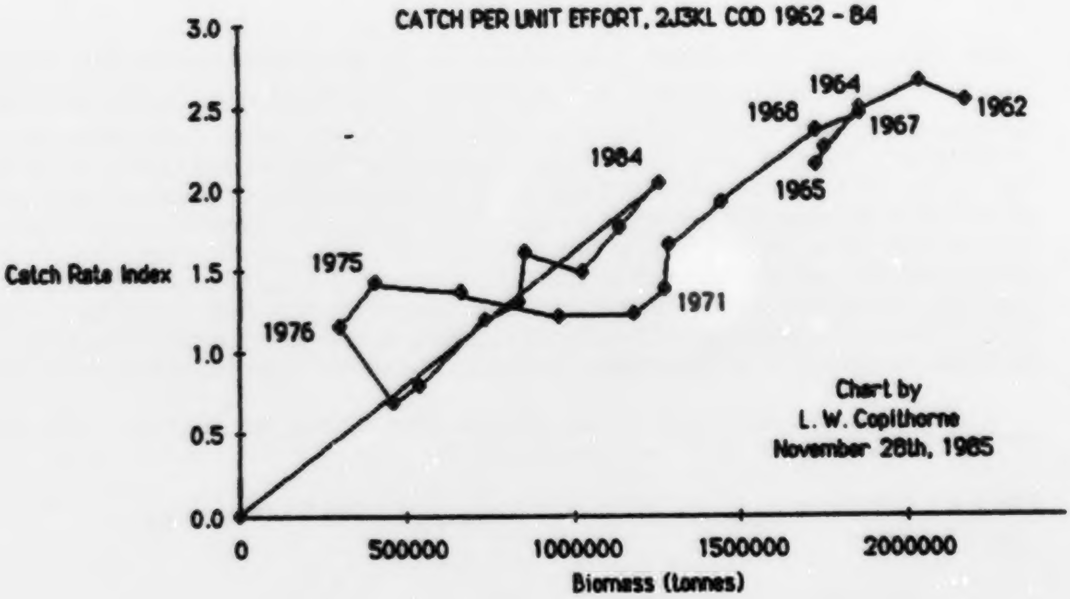
DFO FIGURE 1



Source: Department of Fisheries and Oceans

## CATCH PER UNIT EFFORT, 2J3KL COD 1962 - 1984

## Chart F-3
## Catch per Unit Effort, 2J3KL Cos 1962-1984



Source: Dept. of Fisheries Oceans, P.O. Box 5667 St. John's A1C 5X1 model is much better able to explain the data. It implies that a maximum sustainable yield of about 488,000 tonnes of cod could be harvested annually if the biomass were maintained at 1.81 million tonnes.[3] The author does not feel confident enough of his understanding of the reliability of the data or of the events of 1970-83 in the Newfoundland fishery to draw firm conclusions from these results.

The productivity of fishing effort (tonnes per otter trawler day) has risen as groundfish became more abundant in the NAFO subareas 2-4 (Chart F-2 and DFO Figure 1). A more compatible set of data will be used in Chart F-2 in subsequent drafts of this paper, and a corresponding change will be made in the following regression (where tonnes of groundfish per trawler day are currently regressed on the index of abundance of Cod as a proxy for all groundfish):

$$\begin{array}{llll} \text{Catch/Day} = & 6.487 + & 7.048\ \text{Index}_{65\text{-}77} + & 10.913\ \text{Index}_{78\text{-}82} \\ (t) & (15.68) & (8.76) & (13.20) \end{array}$$

$$\bar{R}^2 = 0.92 \qquad F = 94.97 \qquad DW = 1.78$$

where $\text{Index}_{65\text{-}77}$ is the Index of Abundance for the years from 1965 to 1977 when Extended Fisheries Jurisdiction was introduced, and $\text{Index}_{78\text{-}82}$ is the Index of Abundance for 1978 to 1982. Clearly, there was a significant change in the performance of the fishery after EFJ. An official at the Department of Fisheries and Oceans explains that during the period between 1965 and 1975-76, the Canadian Groundfish catch was almost solely in Subareas 3 and 4 and composed of a variety of species, but mainly flatfish in Subarea 3. After the extension of jurisdiction in 1977, the Canadian Groundfish Fleet moved into the northern cod stock winter fishery hitherto dominated by foreign nations. The Canadian offshore catch from that stock increased very rapidly from almost nil to over 100,000 tonnes in recent years. This change in fishing strategy affected the productivity of Canadian trawlers. It is the more recent experience that should be projected into the future.

An alternative regression can be obtained from relating the catch rate index for 2J3KL Cod as a function of its biomass (Chart F-3).

$$\begin{array}{llll} \text{Catch} = & 1.259\ \text{Biomass}_{62\text{-}74} + & 2.636\ \text{Biomass}_{74\text{-}76} + & 1.586\ \text{Biomass}_{77\text{-}84} \\ (t) & (37.57) & (11.48) & (21.03) \end{array}$$

$$\bar{R}^2 = .89 \qquad F = 87.56 \qquad DW = 1.93$$

The above change in Canadian fishing strategy justifies a dummy variable from 1977 onward. The author includes a dummy variable for 1974-76 merely acknowledging the obvious; these data do not seem to be consistent with a single catch rate function. Calculated growth rate data for 1975-77 (Chart F-1) are rather high while catch rate data for 1974-76 are rather high (Chart F-3). It seems these peaks should coincide and have a common explanation, but the author does not yet know what it is. Since the events leading up to the establishment of Extended Fisheries Jurisdiction seem to make the interpretation of fishery catch data a bit difficult, it is not surprising that the catch rate data are also a bit difficult to interpret.

Neither of the two regressions on trawler productivity are nicely defined as tonnes of fish harvested per day as a function of biomass. Both regressions involve proxies of one of the variables. However, these two different regressions can be "tuned" to the time period 1981-82 (the last two years for which catch data are available). The resultant 'tuned' regressions are:

$Z = H(X) = 6.5 + 7.9\ X$ where Z is catch per trawler day and X is biomass measured in millions of tonnes.

$Z = H^*(X) = 14X$

The first regression represents average otter trawler experience with groundfish of all kinds in NAFO subareas 2-4 in 1962-84 (Chart F-2 and DFO Figure 1). The second tuned regression represents fishing effort in the Northern Cod Stock alone measured in trawler-day equivalents. (The latter regression is based on an index of effort which should reflect a great deal of inshore fishing effort as well as the work of trawlers.)

The two regressions demonstrate very different behaviour, the first showing a diminishing rate of increase in trawler productivity as groundfish biomass increases; the second demonstrating constant returns to scale--the productivity of fishing effort doubles if the size of the biomass doubles.

## Sustained Fishing Effort

The amount of fishing effort (measured in trawler day equivalents) needed to hold biomass constant at any level X is the annual growth of the fish stock Y = F(X) divided by the number of tonnes of fish per trawler day that can be captured when the biomass is at size X. That is, the fishing effort E(X), can be represented as

$$E(X) = Y/Z = \frac{F(X)}{H(X)} = \frac{-183183 + 0.7984\ X - 2.567E\text{-}07\ X^2}{6.5 + 7.9\ X} \quad \text{, or}$$

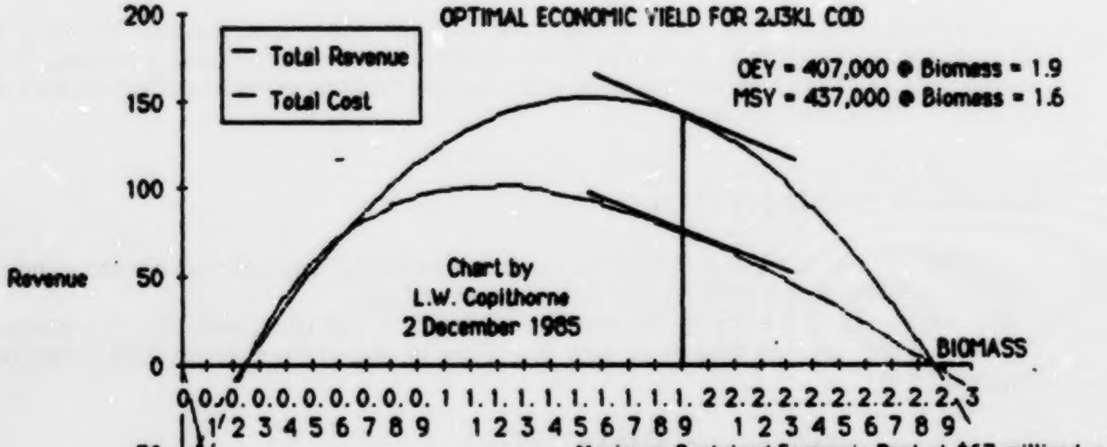
$$E^*(X) = Y/Z^* = \frac{F(X)}{H^*(X)} = \frac{-183183 + 0.7984\ X - 2.567E\text{-}07\ X^2}{14\ X}$$

The Cost of Fishing Effort is merely the effort E(X) in trawler days times the total cost of owning and operating (or renting) a trawler for one day $C_0$.

The total revenue from fishing is the landed price of fish $P_0$ in dollars per metric tonne of cod landed at the fish plant times the total tonnes of cod harvested.

The sustainable economic rent is the difference between total cost and total revenue (see Chart F-4 and Spreadsheet simulation, Table F-2). If one assumes a price of $350 per tonne of landed cod and a trawler cost of $4000 per trawler day, then the maximum sustained economic rent is $65 million at a biomass of 1.9 million tonnes, generating annual growth of 400 thousand tonnes of cod. Catch per trawler day (extrapolating the first productivity regression) is 21.5 tonnes per day. Effort is 18,660 trawler days per year (or about 75 trawler fishing 250 days per year).

## Chart F-4



OPTIMAL ECONOMIC YIELD FOR 2J3KL COD

OEY = 407,000 @ Biomass = 1.9
MSY = 437,000 @ Biomass = 1.6

Chart by
L.W. Copithorne
2 December 1985

Maximum Sustained Economic Rent at $67 million/yr
Biomass = 1.9 million tonnes
Total Allowable Catch = 407 thousand tonnes/yr.
Revenue = $143 million, Cost = $76 million
Catch per trawler day is 21.5 tonnes
Effort is 18,930 trawler days/year

Assume Price = $350/t
Trawler $4000/day

Biomass

## Table F-2
## Simulation Data for Schaefer Model

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Stock | Price | Annual Harvest | Total | Trawler | Alternate | Effort | Alternate | Trawler | Total | Alternate | Economic | Alternate |
| 2 | Level X | (Dollars | (millions) | Revenue | Productivity | Trawler Prody | (trawler | Effort Measure | Rental per | Cost | Total Cost | Rent | Econ. Rent |
| 3 | (tonnes) | per tonne) | Y = F(X) | ($millions) | Tonnes/Day | Tonnes/Day | days/year) | (trawler days) | Day ($) | ($millions) | ($millions) | ($millions) | ($millions) |
| 4 | 0 | 350 | -0.183103 | -64.11485 | 6.5 | 0 | -28192 | | | | | | |
| 5 | 100000 | 350 | -0.10509621 | -37.0871736 | 7.29 | 1.4 | -14627.0606 | -75067.29296571 | 4000 | -58.1108823 | -292.5691171 | 21.04322979 | 296.5219879 |
| 6 | 200000 | 350 | -0.033753242 | -11.817197 | 8.08 | 2.8 | -4179.841189 | -12658.3642857 | 4000 | -16.7145644 | -48.2234671 | 4.897387356 | 36.41929014 |
| 7 | 300000 | 350 | 0.03324537 | 11.6364795 | 8.87 | 4.2 | 3748.969771 | 7915.5864285714 | 4000 | 14.99227908 | 31.66225714 | -3.35630956 | -20.0253779 |
| 8 | 400000 | 350 | 0.09512016 | 33.292056 | 9.66 | 5.6 | 9646.807453 | 16985.74285714 | 4000 | 38.38722981 | 67.94287143 | -5.09517381 | -34.6508154 |
| 9 | 500000 | 350 | 0.15180096 | 53.1513325 | 10.45 | 7 | 14532.14833 | 21694.42142857 | 4000 | 58.1285932 | 86.77766571 | -4.9772806 | -33.6262532 |
| 10 | 600000 | 350 | 0.20346774 | 71.213799 | 11.24 | 8.4 | 18162.1121 | 24222.35 | 4000 | 72.6484484 | 96.8894 | -1.1947294 | -25.675681 |
| 11 | 700000 | 350 | 0.24994053 | 87.4791856 | 12.03 | 9.8 | 20779.42641 | 25604.12571429 | 4000 | 83.10574564 | 102.0195429 | 4.373423884 | -14.54173574 |
| 12 | 800000 | 350 | 0.29127932 | 101.947782 | 12.82 | 11.2 | 22720.88578 | 26087.08214286 | 4000 | 90.88278315 | 104.0283286 | 11.06497806 | -2.08085467 |
| 13 | 900000 | 350 | 0.32748411 | 114.6194386 | 13.61 | 12.6 | 24062.02131 | 25900.90238095 | 4000 | 96.24808523 | 103.6036095 | 18.37135327 | 10.95622989 |
| 14 | 1000000 | 350 | 0.3585549 | 125.494215 | 14.4 | 14 | 24899.04583 | 25611.96428571 | 4000 | 99.59598333 | 102.4448571 | 25.89863167 | 23.04985736 |
| 15 | 1100000 | 350 | 0.38449188 | 134.5720915 | 15.19 | 15.4 | 25312.15686 | 24986.99285714 | 4000 | 101.2486246 | 99.94797143 | 33.32345687 | 34.70412907 |
| 16 | 1200000 | 350 | 0.40529446 | 141.853096 | 15.98 | 16.8 | 25382.00985 | 24124.67142857 | 4000 | 101.528039 | 96.49866571 | 40.46853496 | 45.36436229 |
| 17 | 1300000 | 350 | 0.42096327 | 147.3371446 | 16.77 | 18.2 | 25102.16279 | 23129.06 | 4000 | 100.4065112 | 92.51184 | 46.93049334 | 54.8172446 |
| 18 | 1400000 | 350 | 0.43149069 | 151.024321 | 17.56 | 19.6 | 24572.79245 | 22015.28714286 | 4000 | 98.29112984 | 88.06062857 | 52.73318116 | 62.96349143 |
| 19 | 1500000 | 350 | 0.43689688 | 152.9148075 | 18.35 | 21 | 23809.38163 | 20806.70714286 | 4000 | 95.23806654 | 83.21882857 | 57.67772096 | 69.69575993 |
| 20 | 1600000 | 350 | 0.43716664 | 153.007074 | 19.14 | 22.4 | 22840.42696 | 19518.32321429 | 4000 | 91.36169905 | 78.06528286 | 61.64639275 | 74.94258114 |
| 21 | 1700000 | 350 | 0.43229043 | 151.3044505 | 19.93 | 23.8 | 21689.63944 | 18163.72857143 | 4000 | 86.75325775 | 72.65519532 | 64.54109275 | 78.64926218 |
| 22 | 1800000 | 350 | 0.42229722 | 147.804027 | 20.72 | 25.2 | 20381.12866 | 16757.82619048 | 4000 | 81.52456505 | 67.03128176 | 66.27946715 | 80.77272224 |
| 23 | 1900000 | 350 | 0.40716201 | 142.5067035 | 21.51 | 26.6 | 18929.95374 | 15309.8424812 | 4000 | 75.71595495 | 61.22372982 | 66.79084856 | 81.27933384 |
| 24 | 2000000 | 350 | 0.3866828 | 135.41298 | 22.3 | 28 | 17349.45291 | 13817.6 | 4000 | 69.39781166 | 55.2704 | 66.01460834 | 80.14298 |
| 25 | 2100000 | 350 | 0.36148960 | 126.5213585 | 23.09 | 29.4 | 15655.67726 | 12305.84428571 | 4000 | 62.6227094 | 49.18357714 | 63.89984471 | 77.33800836 |
| 26 | 2200000 | 350 | 0.33095238 | 115.833333 | 23.88 | 30.8 | 13856.97778 | 10745.20714286 | 4000 | 55.42800866 | 42.98082857 | 60.30742465 | 72.85250443 |
| 27 | 2300000 | 350 | 0.29528117 | 103.3484095 | 24.67 | 32.2 | 11980.24878 | 9178.22267906 | 4000 | 47.87099311 | 36.68889048 | 55.47144636 | 66.66751902 |
| 28 | 2400000 | 350 | 0.25442569 | 89.049996 | 25.46 | 33.6 | 9995.120944 | 7573.089285714 | 4000 | 39.98051218 | 30.29475714 | 49.06957302 | 58.77182866 |
| 29 | 2500000 | 350 | 0.20853621 | 72.9876625 | 26.25 | 35 | 7944.257143 | 5958.197857143 | 4000 | 31.77702857 | 23.83277143 | 41.21083302 | 49.15589107 |
| 30 | 2600000 | 350 | 0.15746364 | 55.11223 | 27.04 | 36.4 | 5822.366769 | 4325.921428571 | 4000 | 23.28242308 | 17.30368571 | 31.81821502 | 37.80855319 |
| 31 | 2700000 | 350 | 0.10125633 | 35.4397156 | 27.83 | 37.8 | 3638.387711 | 2678.730000000 | 4000 | 14.55354084 | 10.71469848 | 20.88616406 | 24.72475451 |
| 32 | 2800000 | 350 | 0.03991512 | 13.970292 | 28.62 | 39.2 | 1394.866081 | 1018.262857143 | 4000 | 5.579633124 | 4.072971429 | 8.391058976 | 9.897320571 |
| 33 | 2900000 | 350 | -0.00059490 | -0.2082215 | 29.41 | 40.6 | -962.997246 | -984.1666666667 | 4000 | -3.81228898 | -2.61075764 | -5.08264252 | -5.67927368 |
| 34 | 3000000 | 350 | -0.0981893 | -24.359256 | 30.2 | 42 | -3258.63267 | -3237.36428571 | 4000 | -12.9025063 | -9.34945714 | -21.3568007 | -23.0857079 |

## Table F-1
## Sensitivity Analysis of Economic Rents in 2J3KL Cod

| Price of Fish | \$300/tonne | \$350/tonne | \$400/tonne |
|---|---|---|---|
| Trawler Cost | | (millions of \$) | |
| \$3000/day | 66 | 87 | 118* |
| \$4000/day | 47 | 67 | 87 |
| \$5000/day | 30 | 49 | 68 |

* Using Productivity Function Z = 14X

The sensitivity exercise demonstrates that there may be something between 30 and 120 million in economic rent in the 2J3KL Cod Fishery, assuming it were operated exclusively as a trawler fishery and assuming that the cost of trawlers ranges from \$3000 to \$5000 per day, and that the price of one tonne of landed cod falls between \$300/tonne and \$400/tonne.

To achieve these rents, the biomass would have to be allowed to recover to somewhere between 1.7 and 2.1 million tonnes, and the annual total allowable catch would have to fall between 380 and 410 thousand tonnes per year.

## Dynamic Considerations

The above model was very simple in that it implicitly assumed an interest rate of zero. If one were to make the model dynamic and maximize the present value of net benefits, the optimal size of biomass would be smaller and the optimum economic yield would be larger, but the order of changes would tend to fall into the above ranges. Certainly the Total Allowable catch could not exceed the Maximum Sustained Yield of 435 thousand tonnes per year and the biomass would not fall below 1.5 million tonnes. Given that we have a doubtful fit of data for the biological growth curve itself, our simulations are crude; worring about the fine points of dynamic models makes little sense until we have better biological data.

Nevertheless, the above model demonstrates quite clearly that there is the possibility of considerable economic rent to be harvested each year in the Northern Cod Fishery. If Enterprise allocations were to be made freely marketable, it is not inconceivable that a total allowable catch of some 400 thousands tonnes would command an economic rent of 65 to 80 million dollars, or some \$160 to \$200 per tonne. These rather astounding numbers assume that the fishery were at its optimum economic yield of some 400,000 tonnes per year, and that all fishing were done by trawlers. At the current time, the biomass is much smaller than 1.9 million tonnes, the annual harvest is in the order of 230 thousand tonnes, not 400,000 tonnes. And all of this assumes that the crude growth curve we estimated is valid. At the moment the Department of Fisheries and Oceans has revised downward its projected total allowable catch for 1990 to 326 thousand tonnes.

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## Notes

1. The author has not had time to draw more from the unpublished regressions reported by W.E. Schrank, N. Roy and E. Tsoa. (See their earlier work in 1985.)
2. The model treats the entire fishing effort in 2J3KL Cod in "trawler-day equivalents."
3. One can try different variations of this regression with rather similar results. For example, one can hypothesize that there was modest under-reporting for a longer period, say 1969 through 1975, with more extensive under-reporting during 1972-74 (as is suggested by visual inspection of Chart F-1), but it is only the shorter period of under-reporting that is statistically significant.

## Table F-3
## Biomass of 2J/3KL Cod at January 1st

| Year | Biomass at Jan. 1st | Catch | Growth |
|---|---|---|---|
| 1962 | 2,338,000 | 502,752 | 321,352 |
| 1963 | 2,156,600 | 499,904 | 375,104 |
| 1964 | 2,031,800 | 603,585 | 473,285 |
| 1965 | 1,901,500 | 555,654 | 513,754 |
| 1966 | 1,859,600 | 522,307 | 652,407 |
| 1967 | 1,989,700 | 610,535 | 580,135 |
| 1968 | 1,959,300 | 807,470 | 541,670 |
| 1969 | 1,693,500 | 748,433 | 464,233 |
| 1970 | 1,409,300 | 516,213 | 493,913 |
| 1971 | 1,387,000 | 432,496 | 363,996 |
| 1972 | 1,318,500 | 458,170 | 221,370 |
| 1973 | 1,081,700 | 354,509 | 121,709 |
| 1974 | 848,900 | 372,650 | 61,350 |
| 1975 | 537,600 | 287,508 | 138,608 |
| 1976 | 388,700 | 214,220 | 215,020 |
| 1977 | 389,500 | 172,720 | 382,120 |
| 1978 | 598,900 | 138,559 | 245,759 |
| 1979 | 706,100 | 166,891 | 280,991 |
| 1980 | 820,200 | 175,782 | 246,882 |
| 1981 | 891,300 | 170,748 | 329,948 |
| 1982 | 1,050,500 | 229,774 | 345,774 |
| 1983 | 1,166,500 | 230,213 | 372,313 |
| 1984 | 1,308,600 | 229,229 | |

Source: Department of Fisheries and Oceans, St. John's.

## The Schrank, Roy and Tsoa Model

These authors have now completed a disaggregated, 999 equation integrated model of the 1981 Newfoundland groundfishery in a project which they began under the Economic Council's Newfoundland Reference in 1978-80. They note a recent decline in the productivity of the inshore fishery, and an increase in the productivity of trawlers in the offshore fishery.

For the Cod fishery in 1960-1981, the authors present the following production functions

Model $Q = e^{\gamma}E^{\alpha}P^{\beta}$

where Q is metric tonnes of fish caught per fishing day,
E is aggregate effort measured as productivity-weighted measure of days fishing by different methods, and
P is biomass in metric tonnes.

$Q = e^{-11.61}E^{1.02}P^{0.88}$ based on the Schaefer Model,

or $Q = e^{\gamma}E^{1.14}P^{0.36}$ based on cohort analysis.

The Shaefer growth function they estimate for 2J3KL Cod is

$$\Delta P = P_t - P_{t-1} = \delta P_{t-1} - \eta P_{t-1}^2 - Q_{t-1}$$

with coefficients given as $\Delta P + Q_{t-1} = 0.98P_{t-1} - 4.41*10^{-7}P_{t-1}^2$
Combining these with cost data and their own estimates of the opportunity cost of Newfoundland labour in alternative employment, they calculate social losses (negative economic rents) of between $0.42 and $1.86 per dollar of fish landed in 1980. These losses are smaller than the losses of $1.40 - $3.28 per dollar of fish landings that the authors reported for 1978. Presumably the social losses are smaller because the increase in biomass has made fishing more productive, although the authors do not stress this rationale.

Whereas in 1978 nearly 80% of Newfoundland's cod catch was inshore, the authors note that by 1981, that percentage had fallen to 57%, and it has since fallen further. In one policy simulation, they argue that allocating 80% of the cod catch to the offshore would reduce the implicit subsidy to the fishery from 90¢ per dollar of landed catch to only 50¢. Employment in the fishery would fall. Economices to scale in fish processing would be realized.

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Reference:

Schrank, William E., Eugene Tsoa, and Noel Roy, "An Econometric Model of the Newfoundland Groundfishery: Estimation and Simulaiton", Department of Economics, Memorial University of Newfoundland, January 31st, 1984. (139 page mimeograph prepared for Fisheries and Oceans Canada, Contract number 14SU-00425.

## Appendix Table G-1
## Potential Oil, Natural Gas Liquids and Marketable Gas Reserves of the Hibernia Field

| Fluid Type | Reservoir | Proven | Proven Plus Probable | Proven Plus Probable Plus Possible |
|---|---|---|---|---|
| | | $10^6 m^3$ | (million bbls or billions ft$^3$) | |
| OIL | | | | |
| | Hibernia | 80.9 (509) | 93.8 (509) | 108.4 (682) |
| | Avalon | 18.9 (119) | 42.8 (269) | 73.3 (461) |
| | Seismic B Market | 0.9 (5) | 2.9 (18) | 8.2 (51) |
| | Jeanne D'Arc | - | - | 1.2 (8) |
| | Lower Avalon | - | - | 0.1 (1) |
| | Upper Hibernia | - | - | 0.1 (1) |
| | Total | 100.7 (633) | 139.5 (877) | 191.3 (1205) |
| NATURAL GAS LIQUIDS | | | | |
| | Hibernia | 9.6 (61) | 12.0 (76) | 13.8 (87) |
| | Avalon | 0.2 (1) | 0.6 (4) | 1.0 (6) |
| | Seismic B Marker | 0.9 (5) | 1.2 (8) | 1.8 (11) |
| | Total | 10.7 (67) | 13.8 (88) | 16.6 (104) |
| MARKETABLE GAS RESERVES | | | | |
| | Hibernia | 19,337. (686) | 22,749. (807) | 24,702. (877) |
| | Avalon | 1,493. (53) | 3,246. (115) | 4,470. (159) |
| | Seismic B Marker | 1,792. (64) | 2,669. (95) | 3,582. (127) |
| | Total | 22,622. (803) | 29,664. (1017) | 32,754. (1163) |

Source: Petroleum Directorate, Government of Newfoundland and Labrador, November 12th, 1985.

## APPENDIX TABLE G-2

### The Evolution of Expected Hibernia Production Profiles, Cubic Metres per Year $\times 10^6$

| Date | Metres/yr ECC | Metres/yr Wilby Floating | Metres/yr Eglington & Uffelmann (fixed) | Metres/yr EIS | Metres/yr EIS Update |
|---|---|---|---|---|---|
| 1979 | 0 | 0 | 0 | 0 | 0 |
| 1980 | 0 | 0 | 0 | 0 | 0 |
| 1981 | 0 | 0 | 0 | 0 | 0 |
| 1982 | 0 | 0 | 0 | 0 | 0 |
| 1983 | 0 | 0 | 0 | 0 | 0 |
| 1984 | 0 | 0 | 0 | 0 | 0 |
| 1985 | 9.3915813 | 9.7411833 | 0 | 0 | 0 |
| 1986 | 12.982947 | 13.570914 | 0 | 0 | 0 |
| 1987 | 14.77863 | 16.52664 | 0 | 0 | 0 |
| 1988 | 15.891 | 17.400645 | 0 | 0 | 0 |
| 1989 | 14.063535 | 15.668526 | 0 | 0 | 0 |
| 1990 | 12.442653 | 13.284876 | 0 | 0 | 0 |
| 1991 | 11.012463 | 11.314392 | 4.3541341 | 0 | 0 |
| 1992 | 9.7411833 | 9.5663823 | 11.91825 | 1.39065 | 1.33 |
| 1993 | 8.6288132 | 8.1838652 | 14.3019 | 4.58075 | 4.06 |
| 1994 | 7.6276802 | 6.9602582 | 14.508483 | 8.17965 | 6.38 |
| 1995 | 6.7536752 | 5.9114522 | 14.508483 | 9.85865 | 6.38 |
| 1996 | 5.9750162 | 5.0374471 | 14.508483 | 9.85865 | 6.38 |
| 1997 | 5.2917031 | 4.2270061 | 14.46081 | 9.85865 | 6.38 |
| 1998 | 4.6878451 | 3.5913661 | 14.3019 | 9.85865 | 6.38 |
| 1999 | 4.1475511 | 3.0669631 | 13.98408 | 9.6871 | 6.38 |
| 2000 | 3.6708211 | 2.6061241 | 13.50735 | 8.75635 | 6.38 |
| 2001 | 3.1940911 | 2.2088491 | 11.143564 | 7.07735 | 6.38 |
| 2002 | 2.7491431 | 1.8592471 | 9.1934404 | 5.3947 | 6.38 |
| 2003 | 2.3359771 | 1.446081 | 7.5845883 | 4.1172 | 5.8 |
| 2004 | 1.9387021 | 1.223607 | 6.2572853 | 3.1317 | 4.35 |
| 2005 | 1.604991 | 1.048806 | 5.1622604 | 2.3798 | 3.25 |
| 2006 | 0 | 0.874005 | 4.2588648 | 1.85785 | 2.32 |
| 2007 | 0 | 0 | 3.5135635 | 0 | 1.74 |
| 2008 | 0 | 0 | 2.8986899 | 0 | 1.39 |
| 2009 | 0 | 0 | 2.3914191 | 0 | 1.16 |
| 2010 | 0 | 0 | 1.9729208 | 0 | 0.7 |
| 2011 | 0 | 0 | 1.6276597 | 0 | 0.23 |
| 2012 | 0 | 0 | 1.3428192 | 0 | 0.06 |
| 2013 | 0 | 0 | 1.1078259 | 0 | |
| 2014 | 0 | 0 | 0.9139563 | 0 | |
| 2015 | 0 | 0 | 0.754014 | 0 | |
| | 0 | 0 | 0 | 0 | |
| | 0 | 0 | 0 | 0 | |
| | 0 | 0 | 0 | 0 | |
| | 0 | 0 | 0 | 0 | |
| Totals | 158.91 | 155.31864 | 190.47675 | 95.9877 | 83.81 |

Cash Flow Calculations for J. Wilby's Floating Production Scenario: in 1984$ discounted to 1980

| Date | WILBY metres/yr production | WILBY capital costs (1984$) | WILBY operating costs (1984$) | WILBY discounted total- costs (1984$) | WILBY discounted cash flow, oil @ $220/m ($35/bbl) (1984$) |
|---|---|---|---|---|---|
| 1979 | 0 | | | | |
| 1980 | 0 | 335 | | 335 | -335 |
| 1981 | 0 | 150 | | 136.36364 | -136.36364 |
| 1982 | 0 | 1328 | | 1097.5207 | -1097.5207 |
| 1983 | 0 | 1571 | | 1180.3156 | -1180.3156 |
| 1984 | 0 | 461 | | 314.8692 | -314.8692 |
| 1985 | 9.7411833 | 258 | 250 | 315.42803 | 1015.24382 |
| 1986 | 13.570914 | 104 | 250 | 199.82377 | 1485.47025 |
| 1987 | 16.52664 | 100 | 250 | 179.60534 | 1686.1662 |
| 1988 | 17.400645 | | 250 | 116.62685 | 1669.22965 |
| 1989 | 15.668526 | | 250 | 106.0244 | 1355.87224 |
| 1990 | 13.284876 | | 250 | 96.385822 | 1030.43106 |
| 1991 | 11.314392 | | 250 | 87.623475 | 784.814132 |
| 1992 | 9.5663823 | | 250 | 79.657704 | 590.934021 |
| 1993 | 8.1838652 | | 250 | 72.416095 | 449.110239 |
| 1994 | 6.9602582 | | 250 | 65.832814 | 337.394961 |
| 1995 | 5.9114522 | | 250 | 59.848012 | 251.48601 |
| 1996 | 5.0374471 | | 250 | 54.407284 | 186.777675 |
| 1997 | 4.2270061 | | 250 | 49.461167 | 134.522771 |
| 1998 | 3.5913661 | | 250 | 44.964697 | 97.14183 |
| 1999 | 3.0669631 | | 250 | 40.876998 | 69.4470562 |
| 2000 | 2.6061241 | | 250 | 37.160907 | 48.0635152 |
| 2001 | 2.2088491 | | 250 | 33.782643 | 31.8836249 |
| 2002 | 1.8592471 | | 250 | 30.711493 | 19.5367298 |
| 2003 | 1.446081 | | 250 | 27.919539 | 7.60950722 |
| 2004 | 1.223607 | | 250 | 25.381399 | 1.9486364 |
| 2005 | 1.048806 | | 250 | 23.074 | -1.7778677 |
| 2006 | 0.874005 | | 250 | 20.976363 | -4.84293 |
| 2007 | | | | | |
| 2008 | | | | 4832.0579 | 8182.39408 |
| 2009 | | | | | |
| 2010 | | | | lev'd cost/b | $13.00 |
| 2011 | | | | lev'd cost/m | $81.70 |
| 2012 | | | | | |

Cash Flows for Eglington Uffelmann's Fixed Production Scenario: in 1984$ discounted to 1980

| Date | Eglington & Uffelmann metres/yr production | Eglington & Uffelmann capital costs (1984$) | Eglington & Uffelmann operating costs (1984$) | Eglington & Uffelmann discounted total costs (1984$) @ 1980 | Eglington & Uffelmann discounted cash flow, oil @ $220/m ($35/bbl) (1984$) |
|---|---|---|---|---|---|
| 1979 | | | | | |
| 1980 | 0 | | | 0 | 0 |
| 1981 | 0 | | | 0 | 0 |
| 1982 | 0 | | | 0 | 0 |
| 1983 | 0 | | | 0 | 0 |
| 1984 | 0 | | | 0 | 0 |
| 1985 | 0 | 328 | | 203.66219 | -203.6622 |
| 1986 | 0 | 865 | | 488.26995 | -488.2699 |
| 1987 | 0 | 832 | | 426.94755 | -426.9476 |
| 1988 | 0 | 832 | | 388.13414 | -388.1341 |
| 1989 | 0 | 1066 | | 452.08806 | -452.0881 |
| 1990 | 0 | 235 | | 90.602673 | -90.60267 |
| 1991 | 4.3541341 | 235 | 196 | 151.06287 | 184.67857 |
| 1992 | 11.91825 | 235 | 196 | 137.32988 | 698.12492 |
| 1993 | 14.3019 | 235 | 196 | 124.84535 | 786.5599 |
| 1994 | 14.508483 | 234 | 196 | 113.23244 | 727.28573 |
| 1995 | 14.508483 | 278 | 196 | 113.47183 | 650.6356 |
| 1996 | 14.508483 | 277 | 196 | 102.93858 | 591.70453 |
| 1997 | 14.46081 | 232 | 196 | 84.677518 | 544.74122 |
| 1998 | 14.3019 | | 196 | 35.252323 | 530.65863 |
| 1999 | 13.98408 | | 196 | 32.047566 | 470.98439 |
| 2000 | 13.50735 | | 196 | 29.134151 | 412.57779 |
| 2001 | 11.143564 | | 196 | 26.485592 | 304.79837 |
| 2002 | 9.1934404 | | 196 | 24.077811 | 224.38516 |
| 2003 | 7.5845883 | | 196 | 21.888919 | 164.45831 |
| 2004 | 6.2572853 | | 196 | 19.899017 | 119.8614 |
| 2005 | 5.1622604 | | 196 | 18.090016 | 86.730299 |
| 2006 | 4.2588648 | | 196 | 16.445469 | 62.169767 |
| 2007 | 3.5135635 | | 196 | 14.950426 | 44.011001 |
| 2008 | 2.8986899 | | 196 | 13.591297 | 30.629774 |
| 2009 | 2.3914191 | | 196 | 12.355724 | 20.810079 |
| 2010 | 1.9729208 | | 196 | 11.232476 | 13.641876 |
| 2011 | 1.6276597 | | 196 | 10.211342 | 8.4444218 |
| 2012 | 1.3428192 | | 196 | 9.2830384 | 4.7087847 |
| 2013 | 1.1078259 | | 196 | 8.4391258 | 2.0547415 |
| 2014 | 0.9139563 | | 196 | 7.6719326 | 0.1984679 |
| 2015 | 0.754014 | | 196 | 6.9744841 | -1.071684 |
| | | | Totals | 3195.2938 | 4634.0775 |
| | | | lev'd cost/m | 89.785579 | |
| | | | lev'd cost/b | 14.267827 | |
| Totals | | | | | |

Cash Flows for EIS Update Fixed Production Scenario: in 1984$ discounted to 1980

| Date | EIS Update metres/yr production | EIS Update capital costs (1984$) | EIS Update operating cost (1984$) | EIS Update discounted total costs ($1984) | EIS Update discounted cash flow oil @ $220/m ($35/bbl) (1984$) |
|---|---|---|---|---|---|
| 1980 | | | | 0 | |
| 1981 | | | | 0 | |
| 1982 | | | | 0 | |
| 1983 | | | | 0 | 0 |
| 1984 | | | | 0 | 0 |
| 1985 | | 423.17 | | 262.75528 | -262.7553 |
| 1986 | | 559.7 | | 315.93606 | -315.9361 |
| 1987 | | 632.26 | | 324.44935 | -324.4494 |
| 1988 | | 508.37 | | 237.15836 | -237.1584 |
| 1989 | | 504.08 | | 213.77913 | -213.7791 |
| 1990 | | 571.77 | | 220.44209 | -220.4421 |
| 1991 | | 644.22 | | 225.79518 | -225.7952 |
| 1992 | 1.33 | 424.12 | 397.5 | 261.79345 | -168.5621 |
| 1993 | 4.06 | 214.69 | 397.5 | 177.32964 | 81.398587 |
| 1994 | 6.38 | 214.69 | 397.5 | 161.20876 | 208.40299 |
| 1995 | 6.38 | | 397.5 | 95.15834 | 240.85234 |
| 1996 | 6.38 | | 397.5 | 86.507581 | 218.95667 |
| 1997 | 6.38 | | 397.5 | 78.643256 | 199.05152 |
| 1998 | 6.38 | | 397.5 | 71.493869 | 180.95593 |
| 1999 | 6.38 | | 397.5 | 64.994426 | 164.50539 |
| 2000 | 6.38 | | 397.5 | 59.085842 | 149.55035 |
| 2001 | 6.38 | | 397.5 | 53.714402 | 135.95487 |
| 2002 | 6.38 | | 397.5 | 48.831274 | 123.59533 |
| 2003 | 5.8 | | 397.5 | 44.392068 | 98.109262 |
| 2004 | 4.35 | | 397.5 | 40.356425 | 56.803572 |
| 2005 | 3.25 | | 397.5 | 36.687659 | 29.303979 |
| 2006 | 2.32 | | 397.5 | 33.352418 | 9.4729256 |
| 2007 | 1.74 | | 397.5 | 30.32038 | -1.121282 |
| 2008 | 1.39 | | 397.5 | 27.563981 | -6.358785 |
| 2009 | 1.16 | | 397.5 | 25.058165 | -8.970508 |
| 2010 | 0.7 | | 397.5 | 22.78015 | -13.95463 |
| 2011 | 0.23 | | 397.5 | 20.709227 | -18.07303 |
| 2012 | 0.06 | | 397.5 | 18.82657 | -18.20139 |
| Totals | 83.81 | | | 3259.1233 | -138.6434 |
| | | | lev'd cost/m | 229.77463 | 36.51 /bbl |

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